

EMISSIONS TEST REPORT

TUCSON IRON AND METAL

DIOXIN AND FURAN RETEST ON CONTRABAND INCINERATOR

Air Quality Permit: 127

Prepared for:

Tucson Iron and Metal
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Prepared by:

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Project Number: TIM220419

Test Date: March 16, 2021

Report Issued: April 1, 2021



EXECUTIVE SUMMARY

Tucson Iron and Metal contracted Bison Engineering, Inc. to perform an emissions retest at their metal recycling facility in Tucson, Arizona. Testing was performed on the Contraband Incinerator exhaust stack to demonstrate compliance with Pima County Department of Environmental Quality Air Quality Permit 127 and Title 40 Code of Federal Regulations Part 60, Subpart EEEE. This report presents emissions test data, describes the methods employed and details the quality assurance measures taken to ensure accurate data. Table 1 summarizes the test results.

Table 1: Results Summary

Parameter	Units	Test Result	Permit Limit
Dioxins/Furans Total Basis	ng/dscm at 7% O ₂	59	33
Dioxins/Furans TEQ Basis	ng/dscm at 7% O ₂	1.72	

TEQ – toxicity equivalence quotient

ng/dscm- nanograms per dry standard cubic meter

O₂ - oxygen

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CERTIFICATION FROM RESPONSIBLE OFFICIAL

I have reviewed the information being submitted in its entirety. Based on information and belief formed after reasonable inquiry, I certify that the statements and information contained in this submittal are true, accurate, and complete.

Signature

Date

Name (printed)

Title

Company

REVIEW AND CERTIFICATION

All work, calculations, other activities, and tasks performed and documented in this report were carried out under my direction and supervision. This test project conforms to the requirements of Bison Engineering, Inc.'s quality manual and American Society for Testing and Materials (ASTM) D7036-04.

Project Reviewer: L.Connor Everly, QI

Title: Environmental Scientist

Signature: *L Connor Everly*

Date: 3/30/2021

I have reviewed all testing details, calculations, results, conclusions, and other appropriate written material contained herein, and hereby certify that the presented material is authentic and accurate.

Technical Reviewer: Kelly Dorsi, PhD

Title: Quality Manager / Atmospheric Scientist

Signature: *Kelly Dorsi*

Date: 3/30/2021

1.0 INTRODUCTION

1.1 Project Summary and Objectives

Tucson Iron & Metal (TIM) retained Bison Engineering, Inc. (Bison) to perform a second emissions retest for dioxins and furans on the Contraband Incinerator exhaust stack at their facility in Tucson, Arizona. Testing was performed pursuant to Pima County Department of Environmental Quality (PDEQ) Air Quality Permit 127 and Title 40 Code of Federal Regulations (CFR) Part 60, Subpart EEEE. Bison employed United States Environmental Protection Agency (EPA) test methods as described in Title 40 CFR Part 60, Appendix A. Moisture, stack gas flow, O₂ and carbon dioxide (CO₂) were also measured to satisfy EPA Method 23 requirements. Table 2 summarizes the test methods used during the test campaign.

Table 2: Project Matrix

Tucson Iron and Metal Project Matrix March 16, 2021			
Source	EPA Method	Parameter	Test Plan and Comments
Contraband Incinerator	1	Measurement Location	Completed once prior to testing
	2	Flow	Incorporated with isokinetic sampling
	3A	O ₂ /CO ₂	Three 1-hour test runs concurrent with isokinetic testing.
	4	Moisture	
	23	Dioxins/Furans	Three 1-hour test runs

1.2 Project Contacts

Facility:	Tucson Iron and Metal
Address:	4484 East Tennessee Street
	Tucson, AZ 85714
Contact:	Gary Kippur
Phone:	Office (520) 884-1554
Email:	gary@tucsoniron.net
Consultant:	Bison Engineering, Inc.
Address:	4251 S. Station Master Dr.
	Tucson, AZ 85714
Contact:	Mark Severson
Phone:	Office (520) 749-2176
Email:	mseverson@bison-eng.com
State Authority:	Pima County Department of Environmental Quality
Address:	33 N. Stone Ave, Suite 700
	Tucson, AZ 85701
Contact:	Jacqueline Ronstadt
Phone:	Office (520) 724-7400
Email:	jacqueline.ronstadt@pima.gov
Contract Laboratory:	ALS Environmental- Houston HRMS
Address:	10450 Stancliff Rd, Suite 210
	Houston, TX
Contact:	Corey Grandits
Phone:	Office (281) 530-5656
Email:	Corey.Grandits@alsglobal.com

1.3 Testing Personnel

The Bison on-site testing team was led by L. Connor Everly, Qualified Individual (QI), Environmental Scientist. Connor was assisted during field testing by Angel Medina, Qualified Individual (QI), Environmental Scientist, and Jeremy Clark, QI, Environmental Scientist. Connor served as project manager. Connor processed the test data and authored this report. Kelly Dorsi, PhD, Atmospheric Scientist, performed a final quality assurance review of the data and test report.

Gary Kippur, owner, was the primary contact for TIM. Gary was not present on-site for the duration of the second retest. TIM staff members were responsible for monitoring process parameters during testing.

PDEQ representative, Mark Rodgers, was present for a portion of the second retest campaign.

2.0 SOURCE DESCRIPTION

2.1 Facility Description

TIM owns and operates a metal recycling facility that serves the greater Tucson area. In addition to recycling, the facility operates a contraband incineration unit that destroys substances collected by law enforcement.

2.2 Emission Source Description

The contraband incinerator burns less than 35 tons per day and is classified as an Other Solid Waste Incinerator (OSWI). Materials destroyed by the incinerator are limited to marijuana, cocaine, methamphetamine, pharmaceuticals, wood, paper, burlap or fabric, and associated wrapping materials.

Incinerator process off-gases are controlled by an afterburner and the use of good combustion practices. A trona or sodium carbonate sorbent injection system provides additional control of SO₂ and HCl emissions. A baghouse is installed on the exhaust to control emissions of PM and opacity.

The contraband fed into the OSWI unit is primarily combustible carbonaceous vegetative material. Upon thermal oxidation, the materials are broken down into CO₂ and water along with minor amounts of other products of combustion (POC) such as NO_x, PM, volatile organic compounds (VOC), HCl and SO₂. Narcotics and plastic wrapping materials may contain mineral and/or chlorinated compounds, which contribute to ash, HCl and SO₂ formation. Occasionally upon incineration, sulfur compounds such as grease or oil coatings on the packaging are emitted as PM and SO₂. TIM utilizes sorbent injection following the afterburner for the control of SO₂ and HCl. The contraband feed rate of no more than 2,000 pounds per hour (lb/hr) of marijuana and 30 lb/hr of narcotics restricts the available amount of chemical constituents that result in POC from the combustion process. The afterburner that follows the primary combustion chamber maintains a minimum temperature of 1,400 degrees Fahrenheit (°F) whenever introducing contraband. This temperature is sufficient to ensure complete combustion of any partial combustion products remaining in the effluent from the primary combustion chamber.

The induction blower configuration of the baghouse system (with fresh air makeup vents built into the incinerator exhaust ductwork) is balanced to allow the exhaust ductwork system to operate under negative pressure. Fresh air drawn into the exhaust duct allows the cooling of the hot incinerator exhaust before its introduction into the baghouse, protecting the filter fabric from thermal degradation. Pressure drop across the filter media is monitored for proper particulate emissions control efficiency in the baghouse.

TIM's OSWI typically operates two to three days per week on a schedule coordinated with Customs and Border Protection or other law enforcement agencies under contract with the company.

The Contraband Incinerator exhaust stack is approximately 35 feet tall and 44 inches inner diameter. Two test ports were accessed via the top of the baghouse. While on-site, Bison verified the exhaust stack meets EPA Method 1 specifications; detailed Method 1 information is included in the appendices to this report.

3.0 EMISSION TEST RESULTS

3.1 Summary of Results

Table 3 summarizes the Contraband Incinerator test results reported on TEQ and total bases normalized to 7% O₂. Additional supporting material, including raw data, laboratory data, plant data, example calculations and calibration records, can be found in the appendices to this report. Methods 1, 2, 3A, 4, and 23 were performed on March 16, 2021.

Table 3: Method 23 Results

Tucson Iron and Metal Contraband Incinerator Method 23 Test Results March 16, 2021						
Parameter	Units	Run 1	Run 2	Run 3	Average	Limit
Run Start Time		9:50	11:26	12:51		
Run End Time		10:55	12:34	13:56		
Run Duration	minutes	60	60	60	60	
Velocity	FPS	46.37	48.44	51.52	48.78	
H ₂ O	%v	3.98	2.51	2.43	2.97	
CO ₂	%vd	2.15	1.83	1.95	1.98	
O ₂	%vd	18.56	18.81	18.80	18.72	
Sample Volume	dscm	40.049	41.264	44.612	41.975	
Isokinetic Average	%	101.9	99.4	100.4	100.6	
Stack Temp	F	208.5	212.6	208.7	209.9	
Dioxins/Furans TEQ*	ng/dscm	1.76	1.29	2.12	1.72	
Dioxins/Furans Total Basis*	ng/dscm	88	13	75	59	33

*Dioxin/Furan results are corrected to 7% O₂.

FPS – feet per second

%v – percent by volume

%vd – percent by volume dry basis

dscm – dry standard cubic meter

3.2 Operating Conditions

Representatives of TIM recorded details of plant operations during testing. TIM personnel compiled the raw process data and provided it to Bison for use in this report. Process data is presented in the report appendices.

3.3 Field Observations

Testing was performed as outlined in the test protocol dated June 19, 2020. No adverse or unusual environmental conditions were noted that are known to have influenced the outcome of these tests.

4.0 EMISSION TEST METHODS AND PROCEDURES

4.1 Testing Methods and Procedures

Bison testing personnel performed the following EPA methods as described in Title 40 CFR 60, Appendix A.

EPA Reference Method 1, "Sample and Velocity Traverses for Stationary Sources." The objective of Method 1 is to determine a suitable location for testing and to determine the velocity and/or sample points for the source. The results of Method 1 sampling location and sample or velocity point measurement locations are included in the appendices.

EPA Reference Method 2, "Determination of Stack Gas Velocity and Volumetric Flow Rate (Type-S Pitot Tube)." The objective of Method 2 is to determine volumetric flow. The average velocity, temperature, static pressure, and source area are used to calculate volumetric flow for the source. This method is incorporated within the performance of Method 23.

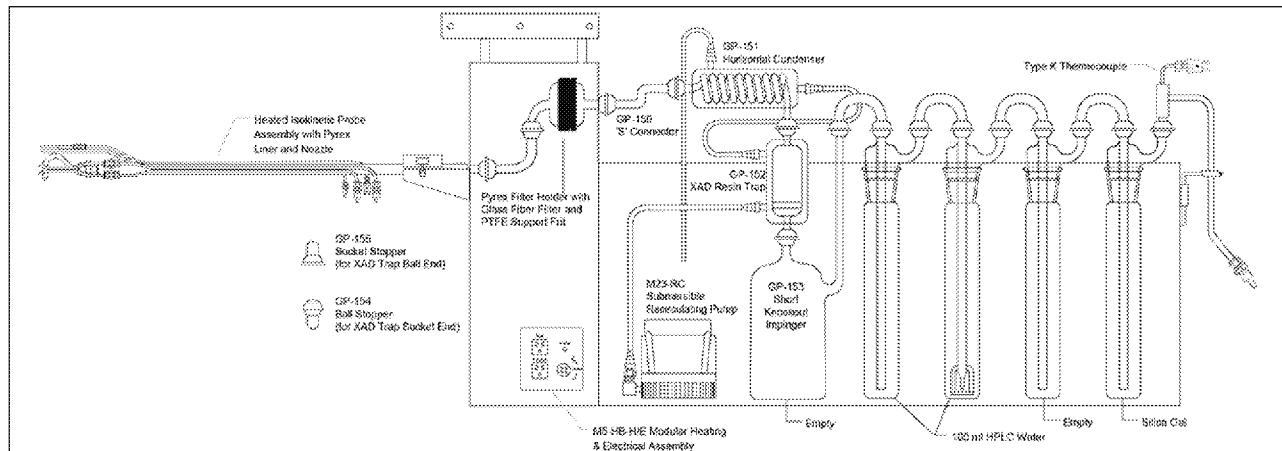
EPA Reference Method 3A, "Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)." The objective of Method 3A is to determine the O₂ and CO₂ concentrations in the stack gas stream.

EPA Reference Method 4, "Determination of Moisture Content in the Stack Gases." The objective of Method 4 is to determine the moisture content of a gas stream. This method is incorporated within the performance of Method 23.

EPA Reference Method 23, "Determination of Polychlorinated Dibenz-p-Dioxins and Polychlorinated Dibenzofurans from Stationary Sources." The objective of Method 23 is to determine the polychlorinated dibenzo-p-dioxins (PCDD's) and polychlorinated dibenzofurans (PCDF's) emissions from a stationary source. Method 23 is an isokinetic sampling method similar to Method 5. The sample is collected in the probe, on a glass fiber filter and on a packed column of absorbent material. The PCDD/PCDF are extracted from the sample, separated by high resolution gas chromatography, and measured by high resolution mass spectrometry. Figure 1 (below) shows a schematic of the Method 23 sample train.

For safety of Bison's testing team, EPA Method 23 ALT-052 was used, with PDEQ approval, to omit the use of the chemical methylene chloride in the Method 23 sample recovery process. This is an EPA accepted alternative and has no significant bias on test results.

Figure 1: Method 23 Sample Train



4.2 Sample Handling and Analytical Procedures

All analytical procedures complied with EPA methodology. Method 23 samples were sent under chain of custody to ALS Environmental in Houston, Texas. The report from ALS can be found in the appendices.

APPENDIX A: METHOD 23 DATA



COMPANY	Tucson Iron and Metals
FACILITY	Metal Recycling Facility
LOCATION	Tucson, AZ
SOURCE	Contraband Incinerator
DATE	03/16/21
METHOD	23
POLLUTANT	Dioxins and Furans

EPA Method 1
Stack Parameters and Traverse Points

Client: Tucson Iron and Metals
Location: Tucson, AZ
Source: Contraband Incinerator
Facility: Metal Recycling Facility

Type of Testing: P (P for Particulate; V for Velocity/Nonparticulate)
Type of Duct: C (C for circular; R for rectangular)

Number of ports available: 2
Number of ports to be used: 2
Port diameter: 4 inches
Sampling location height (approx.): feet
Stack height (approx.): feet

Circular ID (Rectangular Depth): 44.00 inches
Port depth and/or wall thickness: 4.00 inches
Stack width (Rectangular only): inches

Equivalent Diameter
If rectangular = $\frac{2 \times \text{Depth} \times \text{Width}}{\text{Depth} + \text{Width}}$ = 44.00 inches (If circular = duct ID)

Stack/duct area = 10.559 sq.feet 1520.5 sq.inches

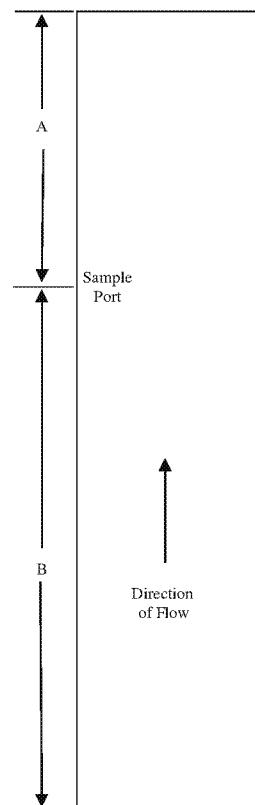
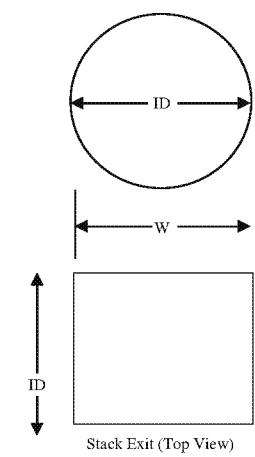
Sample Port Location:	Downstream flow disturbance from process	Upstream flow disturbance toward exit
	B	A
Number of Inches:	264.00	156.00
Number of Diameters:	6.00	3.55

Minimum Number of Traverse Points: 20

Traverse points less than 1.0 inch from the stack wall are relocated to a distance of 1.0 inch.

Points	% of diameter	Distance from inside wall (in.)	Distance including port (in.)
1	2.6	1.14	5 1/8
2	8.2	3.61	7 5/8
3	14.6	6.42	10 3/8
4	22.6	9.94	14
5	34.2	15.05	19
6	65.8	28.95	33
7	77.4	34.06	38
8	85.4	37.58	41 5/8
9	91.8	40.39	44 3/8
10	97.4	42.86	46 7/8

Reference Diagram



Drawing NOT to scale and
NOT an accurate representation of stack.

Pre-Test Traverse

Client: Tucson Iron and Metals
Location: Tucson, AZ
Source: Contraband Incinerator

Stack Temp: 220 °F

Traverse Point	Velocity ΔP ('H ₂ O)	Null Angle
1	0.21	10
2	0.20	4
3	0.25	9
4	0.23	9
5	0.37	6
6	0.58	4
7	0.62	4
8	0.60	2
9	0.64	6
10	0.55	5
11	0.56	10
12	0.58	2
13	0.36	14
14	0.77	6
15	0.54	7
16	0.59	9
17	0.65	7
18	0.76	5
19	0.68	4
20	0.52	4

Average: 0.51 6

Flow is found to be: Non-cyclonic

Isokinetic Field Data
Field Data Entry

Client: Tucson Iron and Metals **Run:** 1
Location: Tucson, AZ **Start Time:** 9:50
Source: Contraband Incinerator **End Time:** 10:55
EPA Method: 23 **Environmental Conditions/Test Notes:**
Box Operator: AAM Rainy, 55 degrees
Technician(s): JPC

Stack Dimensional Data:

	Equipment:		
Circular	Meterbox ID	Box 8	Probe ID
Diameter	Y factor	0.985	Nozzle ID
Rectangular	ΔH@	1.857	Hot box ID
Width	Bp ID	TTB-2	Pitot Cp
Length	Balance ID	WSS-1	Pitot ID
Stack Area	Weights ID	TUC SW1	Probe Length, ft

Source Information:

				Leak Checks:	Pre-test	Post-test
Barometric Pressure	27.24 "Hg	O ₂	18.56 %	Pitot	x	x
Static Pressure	0.32 "H ₂ O	CO ₂	2.15 %	Leak rate, dcf	0.010	0.015
Ave. ΔP	0.51 "H ₂ O	Rec. Nz.	0.253 inches	Leak check vacuum, "Hg	17	20
Stack Temperature	220 °F					
Assumed moisture	3.00 %					
Assumed meter temp.	65 °F					
Total number of points	20					
Time per point	3 min.					
Total run time	60 min.					

Post Test Calculations:

				Moisture/Lab:		
Sample volume	43.618 dcf	Ave. ΔP	0.508 "H ₂ O	Filter, #	1	
Wet mol. weight	28.65 M _s (actual)	Ave. √ΔP	0.698 "H ₂ O		Initial	Final
Actual H ₂ O	3.98 %	Ave. ΔH	1.667 "H ₂ O	Impingers, g	2,663.6	2,688.6
Std. meter vol.	40.049 dscf	Ave. T _s	208.5 °F	Silica gel, g	900.3	910.5
Isokinetic Average	101.9 %	Ave. T _m	57.7 °F	Total water gain, g:		35.2

Traverse Point	Time (min.)	Meter Volume (dcf)										
			Velocity ΔP ("H ₂ O)	Stack Temp. (°F)	Meter Temp. (°F)	Calc. ΔH	Run ΔH	Vacuum ("Hg)	Filter Box (°F)	Condenser Temp (≤68°F)	XAD Trap Temp	
1	3.0	551.370	0.17	195	56	0.57	0.57	4	261	48	41	
2	6.0	552.690	0.22	198	56	0.73	0.73	4.5	252	43	39	
3	9.0	554.080	0.20	199	58	0.66	0.70	5	258	42	39	
4	12.0	555.670	0.25	203	58	0.83	0.85	6	246	42	39	
5	15.0	557.540	0.35	201	58	1.16	1.15	7.5	250	43	39	
6	18.0	560.040	0.62	200	59	2.06	2.10	10	262	44	41	
7	21.0	562.520	0.61	204	59	2.02	2.00	10	252	45	42	
8	24.0	564.930	0.59	205	58	1.94	1.90	10	250	48	41	
9	27.0	567.380	0.60	206	58	1.97	2.00	10	250	50	41	
10	30.0	569.792	0.57	208	57	1.86	1.90	10	248	51	41	
11	33.0	572.160	0.57	210	57	1.86	1.90	10	247	51	41	
12	36.0	574.520	0.55	210	57	1.79	1.80	9.5	257	51	42	
13	39.0	576.270	0.30	209	57	0.98	0.98	6	252	51	41	
14	42.0	578.850	0.73	212	58	2.38	2.40	11	250	51	41	
15	45.0	581.250	0.57	214	58	1.85	1.85	9	249	52	41	
16	48.0	583.610	0.58	214	58	1.88	1.90	9	250	53	41	
17	51.0	586.150	0.67	215	58	2.17	2.20	10.5	248	53	41	
18	54.0	588.910	0.79	219	58	2.55	2.55	12	252	54	41	
19	57.0	591.430	0.67	222	58	2.15	2.15	10	250	56	41	
20	60.0	593.728	0.54	226	58	1.72	1.70	8.5	249	56	42	

Isokinetic Field Data
Field Data Entry

Client: Tucson Iron and Metals
Location: Tucson, AZ
Source: Contraband Incinerator
EPA Method: 23
Box Operator: AAM
Technician(s): JPC

Environmental Conditions/Test Notes:
Sunny, 55 degrees, no wind

Run: 2
Start Time: 11:26
End Time: 12:34
Date: 3/16/2021

Stack Dimensional Data:

Circular
 Diameter 44.000 in
 Rectangular
 Width in
 Length in
 Stack Area 10.559 sq.ft.

Equipment:

Meterbox ID	Box 8	Probe ID	T-6-2	Liner type	Glass
Y factor	0.985	Nozzle ID	626	Nozzle size	0.250 inches
ΔH@	1.857	Hot box ID	HB-2	Nozzle area	0.000341 sq.ft.
Bp ID	TTB-2	Pitot Cp	0.84	Probe heat	250 °F
Balance ID	WSS-1	Pitot ID	T-PT-29	Filter heat	250 °F
Weights ID	TUC SW1	Probe Length, ft	6		

Source Information:

Barometric Pressure	27.28 "Hg	O ₂	18.81 %
Static Pressure	0.32 "H ₂ O	CO ₂	1.83 %
Ave. ΔP	0.51 "H ₂ O	Rec. Nz.	0.256 inches
Stack Temperature	220 °F		
Assumed moisture	3.98 %		
Assumed meter temp.	57.7 °F		
Total number of points	20		
Time per point	3 min.		
Total run time	60 min.		

Leak Checks: Pre-test Post-test

Pitot	x	x
Leak rate, dcf	0.005	0.008
Leak check vacuum, "Hg	18	24

Nozzle check for roundness:

1	2	3
0.250	0.251	0.250 inches
Caliper ID	TMC-2	

Post Test Calculations:

Sample volume	45.057 dcf	Ave. ΔP	0.538 "H ₂ O
Wet mol. weight	28.77 M _s (actual)	Ave. √ΔP	0.729 "H ₂ O
Actual H ₂ O	2.51 %	Ave. ΔH	1.761 "H ₂ O
Std. meter vol.	41.264 dscf	Ave. T _s	212.6 °F
Isokinetic Average	99.4 %	Ave. T _m	59.9 °F

Moisture/Lab:

Filter, #	2		
	Initial	Final	Gain
Impingers, g	2,430.5	2,438.4	7.9
Silica gel, g	931.8	946.4	14.6
	Total water gain: 22.5		

Traverse Point	Time (min.)	Meter	Velocity ΔP ("H ₂ O)	Stack Temp. (°F)	Meter	Calc. ΔH	Run ΔH	Vacuum ("Hg)	Filter Box (°F)	Condenser	XAD
		Volume (dcf)			Temp. (°F)					Temp. (°F)	Trap Temp
1	3.0	594.106	0.35	221	58	1.11	1.15	12	255	57	51
2	6.0	595.970	0.40	220	59	1.27	1.30	12	256	55	50
3	9.0	597.930	0.43	218	59	1.37	1.40	12	251	55	51
4	12.0	599.960	0.42	216	59	1.34	1.40	12	250	52	52
5	15.0	601.950	0.42	213	59	1.70	1.75	13	246	52	53
6	18.0	604.190	0.53	211	59	1.67	1.70	13	251	54	53
7	21.0	606.420	0.52	212	60	1.90	1.95	14	250	55	56
8	24.0	608.820	0.59	209	60	1.84	1.90	14	253	56	55
9	27.0	611.160	0.57	207	59	2.17	2.20	16	247	60	58
10	30.0	613.650	0.67	205	60	2.21	2.20	16	251	60	54
11	33.0	616.207	0.68	212	61	1.66	1.70	13	253	57	49
12	36.0	618.430	0.51	205	60	2.11	2.10	16	250	56	48
13	39.0	620.910	0.65	207	60	2.17	2.17	16	250	54	48
14	42.0	623.440	0.67	209	60	2.28	2.30	17	249	54	48
15	45.0	626.050	0.71	212	61	2.00	2.00	16	249	54	47
16	48.0	628.460	0.62	214	62	2.03	2.10	17	247	53	47
17	51.0	630.920	0.63	215	61	1.22	1.25	14	251	52	45
18	54.0	632.810	0.38	213	60	1.09	1.10	13.5	246	51	44
19	57.0	634.630	0.34	215	60	1.35	1.40	14	249	50	44
20	60.0	636.640	0.42	218	61	2.14	2.15	16	250	50	44

Isokinetic Field Data
Field Data Entry

Client: Tucson Iron and Metals
Location: Tucson, AZ
Source: Contraband Incinerator
EPA Method: 23
Box Operator: AAM
Technician(s): JPC

Environmental Conditions/Test Notes:
Sunny, 65 degrees, no wind

Run: 3
Start Time: 12:51
End Time: 13:56
Date: 3/16/2021

Stack Dimensional Data:

Circular
Diameter 44.000 in
Rectangular
Width in
Length in
Stack Area 10.559 sq.ft.

Equipment:

Meterbox ID	Box 8	Probe ID	T-6-2	Liner type	Glass
Y factor	0.985	Nozzle ID	626	Nozzle size	0.250 inches
ΔH@	1.857	Hot box ID	HB-2	Nozzle area	0.000341 sq.ft.
Bp ID	TTB-2	Pitot Cp	0.84	Probe heat	250 °F
Balance ID	WSS-1	Pitot ID	T-P-T-29	Filter heat	250 °F
Weights ID	TUC SW1	Probe Length, ft	6		

Source Information:

Barometric Pressure	27.29 "Hg	O ₂	18.80 %
Static Pressure	0.32 "H ₂ O	CO ₂	1.95 %
Ave. ΔP	0.51 "H ₂ O	Rec. Nz.	0.254 inches
Stack Temperature	220 °F		
Assumed moisture	2.51 %		
Assumed meter temp.	59.9 °F		
Total number of points	20		
Time per point	3 min.		
Total run time	60 min.		

Leak Checks: Pre-test Post-test

Pitot	x	x
Leak rate, dcf	0.003	0.012
Leak check vacuum, "Hg	20	15

Nozzle check for roundness:

1	2	3
0.250	0.251	0.250 inches
Caliper ID	TMC-2	

Post Test Calculations:

Sample volume	48.802 dcf	Ave. ΔP	0.618 "H ₂ O
Wet mol. weight	28.79 M _s (actual)	Ave. √ΔP	0.778 "H ₂ O
Actual H ₂ O	2.43 %	Ave. ΔH	2.014 "H ₂ O
Std. meter vol.	44.612 dscf	Ave. T _s	208.7 °F
Isokinetic Average	100.4 %	Ave. T _m	61.4 °F

Moisture/Lab:

Filter, #	3		
	Initial	Final	Gain
Impingers, g	2,740.9	2,751.7	10.8
Silica gel, g	992.0	1,004.8	12.8
Total water gain:	23.6		

Traverse Point	Time (min.)	Meter Volume (dcf)	Velocity ΔP ("H ₂ O)	Stack Temp. (°F)	Meter Temp. (°F)	Calc. ΔH	Run ΔH	Vacuum ("Hg)	Filter Box (°F)	Condenser Temp (≤68°F)	XAD Trap Temp
1	3.0	641.400	0.35	210	60	1.16	1.15	5	235	55	43
2	6.0	643.270	0.35	210	60	1.16	1.15	5	240	54	40
3	9.0	644.990	0.30	208	60	1.00	1.00	5	240	53	40
4	12.0	648.030	1.00	209	61	3.32	3.25	12	244	53	43
5	15.0	650.970	0.85	200	60	2.85	2.80	11	258	57	45
6	18.0	653.620	0.70	199	61	2.36	2.30	9.5	255	61	45
7	21.0	656.140	0.65	205	61	2.17	2.10	9	252	63	44
8	24.0	658.550	0.60	206	61	2.00	1.95	8.5	254	63	44
9	27.0	661.010	0.62	206	61	2.07	2.02	8.5	253	64	45
10	30.0	663.457	0.60	206	62	2.00	1.95	8.5	252	63	44
11	33.0	666.000	0.65	209	62	2.16	2.10	9	245	63	42
12	36.0	668.530	0.62	210	61	2.05	2.00	9	244	61	42
13	39.0	670.940	0.60	212	62	1.99	1.95	8.5	251	60	42
14	42.0	673.380	0.62	213	62	2.05	2.00	8.5	251	60	41
15	45.0	675.780	0.59	212	62	1.95	1.90	8	248	59	40
16	48.0	678.420	0.71	213	62	2.35	2.30	9	251	59	40
17	51.0	681.030	0.70	213	62	2.31	2.30	9	249	59	40
18	54.0	683.690	0.73	212	62	2.42	2.40	9.5	248	59	41
19	57.0	686.380	0.71	212	63	2.36	2.35	9	232	59	41
20	60.0	688.352	0.40	209	62	1.33	1.30	6	251	58	40

Isokinetic Field Data**Field Data and Calculations****Emissions and Gas Stream Characteristics**Client: **Tucson Iron and Metals**Run: **1**Location: **Tucson, AZ**Start Time: **9:50**Source: **Contraband incinerator**End Time: **10:55**Method: **23**Date: **3/16/2021**

Sampling Data				Traverse Data			
Time min.	Meter ft ³	ΔH °H ₂ O	Meter T _m °F	Traverse Point	Dp °H ₂ O	Stack T _s °F	√Dp
	550.110						
3.0	551.370	0.57	56	1	0.17	195	0.412
6.0	552.650	0.73	56	2	0.22	198	0.469
9.0	554.080	0.70	58	3	0.20	199	0.447
12.0	555.670	0.85	58	4	0.25	203	0.500
15.0	557.540	1.15	58	5	0.35	201	0.592
18.0	560.040	2.10	59	6	0.62	200	0.787
21.0	562.520	2.00	59	7	0.61	204	0.781
24.0	564.930	1.90	58	8	0.59	205	0.768
27.0	567.380	2.00	58	9	0.60	206	0.775
30.0	569.792	1.90	57	10	0.57	208	0.755
33.0	572.160	1.90	57	11	0.57	210	0.755
36.0	574.520	1.80	57	12	0.55	210	0.742
39.0	576.270	0.98	57	13	0.30	209	0.548
42.0	578.850	2.40	58	14	0.73	212	0.854
45.0	581.250	1.85	58	15	0.57	214	0.755
48.0	583.610	1.90	58	16	0.58	214	0.762
51.0	586.150	2.20	58	17	0.67	215	0.819
54.0	588.910	2.55	58	18	0.79	219	0.889
57.0	591.430	2.15	58	19	0.67	222	0.819
60.0	593.728	1.70	58	20	0.54	226	0.735

Client: Tucson Iron and Metals
Source: Contraband incinerator

Run:

Field Data Input Continued

<u>Moisture Data</u>		<u>Stack Dimensional Data:</u>	
Total Test Time	60.0 min	Circular	
Sample Time Interval	3.0 min	Diameter	44.000 in
Meter Volume, V_m	43.618 dcf	Rectangular	
Water Volume	35.2 g	Width	in
Nozzle Diameter, N_z	0.250 in.	Length	in
Nozzle Area	0.000341 sq.ft.	Stack Area	10.559 sq.ft.

<u>Traverse Data</u>		<u>Molecular Weight:</u>	
Barometric Pressure, P_b	27.24 "Hg	CO_2 Average	2.15 %vd
Static Pressure	0.32 " H_2O	O_2 Average	18.56 %vd
Pitot Factor, c_p	0.84		
Meter Cal Factor	0.985 Y		

Field Data Averages

<u>Meter</u>		<u>Stack</u>	
ΔH	1.667 "H ₂ O	$\sqrt{D_p}$	0.698 "H ₂ O
Temperature, T _m	57.7 °F	Temperature, T _s	208.5 °F
Temperature, T _m	517.7 °A (°R)	Temperature, T _s	668.5 °A (R)
Pressure Meter, P _m	27.363 "Hg	Pressure Stack, P _s	27.264 "Hg

Field Data Calculations

Meter Box Capture

Standard Volume, $V_{m(\text{std})}$	40.049 dscf	Velocity, V_s	46.37 fps
Actual Volume, $V_{m(\text{actual})}$	1.134 dsem	Volume (actual)	29,377 acfm
<u>Gas Stream Moisture</u>	57.988 awcf	Volume (standard)	28,208 adcfm
Moisture Vapor, $V_{W(\text{std})}$	1.660 scf		1,267,802 wscf/hr
Moisture, B_{ws}	0.0398		1,217,343 dscf/hr
Moisture EPA M4	3.98 %v		20,289 dscf/min
Moisture @ Saturation	102.33 %v (for $T_s \leq 212^\circ\text{F}$)		21,130 wscfm
<u>EPA Method 3 Gas Density</u>			
Dry, M_d	29.09 lb/lb-mole		
Wet, M_s	28.65 lb/lb-mole		
Percent Isokinetic	101.9 %		

Isokinetic Field Data**Field Data and Calculations****Particulate Emissions and Gas Stream Characteristics**Client: **Tucson Iron and Metals**Run: **2**Location: **Tucson, AZ**Start Time: **11:26**Source: **Contraband incinerator**End Time: **12:34**Method: **23**Date: **03/16/21**

Sampling Data				Traverse Data			
Time min.	Meter ft ³	ΔH °H ₂ O	Meter T _m °F	Traverse Point	Dp °H ₂ O	Stack T _s °F	√Dp
	594.106						
3.0	595.970	1.15	58	1	0.35	221	0.592
6.0	597.930	1.30	59	2	0.40	220	0.632
9.0	599.960	1.40	59	3	0.43	218	0.656
12.0	601.950	1.40	59	4	0.42	216	0.648
15.0	604.190	1.75	59	5	0.53	213	0.728
18.0	606.420	1.70	59	6	0.52	211	0.721
21.0	608.820	1.95	60	7	0.59	212	0.768
24.0	611.160	1.90	60	8	0.57	209	0.755
27.0	613.650	2.20	59	9	0.67	207	0.819
30.0	616.207	2.20	60	10	0.68	205	0.825
33.0	618.430	1.70	60	11	0.51	205	0.714
36.0	620.910	2.10	60	12	0.65	207	0.806
39.0	623.440	2.17	60	13	0.67	209	0.819
42.0	626.050	2.30	60	14	0.71	212	0.843
45.0	628.460	2.00	61	15	0.62	212	0.787
48.0	630.920	2.10	62	16	0.63	214	0.794
51.0	632.810	1.25	61	17	0.38	215	0.616
54.0	634.630	1.10	60	18	0.34	213	0.583
57.0	636.640	1.40	60	19	0.42	215	0.648
60.0	639.163	2.15	61	20	0.67	218	0.819

Client:	Tucson Iron and Metals	Run:	2
Source:	Contraband incinerator	Date:	03/16/21

Field Data Input Continued

<u>Moisture Data</u>		<u>Stack Dimensional Data:</u>	
Total Test Time	60.0 min	Circular	
Sample Time Interval	3.0 min	Diameter	44.000 in
Meter Volume, V _m	45.057 dcf	Rectangular	
Water Volume	22.5 g	Width	in
Nozzle Diameter, N _z	0.250 in.	Length	in
Nozzle Area	0.000341 sq.ft.	Stack Area	10.559 sq.ft.

Traverse Data

<u>Traverse Data</u>		<u>Molecular Weight:</u>	
Barometric Pressure, P _b	27.28 "Hg	CO ₂ Average	1.83 %vd
Static Pressure	0.32 "H ₂ O	O ₂ Average	18.81 %vd
Pitot Factor, cp	0.84		
Meter Cal Factor	0.985 Y		

Field Data Averages

<u>Meter</u>		<u>Stack</u>	
ΔH	1.761 "H ₂ O	√Dp	0.729 "H ₂ O
Temperature, T _m	59.9 °F	Temperature, T _s	212.6 °F
Temperature, T _m	519.9 °A (°R)	Temperature, T _s	672.6 °A (R)
Pressure Meter, P _m	27.409 "Hg	Pressure Stack, P _s	27.304 "Hg

Field Data Calculations

Meter Box Capture

Standard Volume, V_{m(std)}

41.264 dscf

1.168 dscm

Actual Volume, V_{m(actual)}

59.121 awcf

Gas Stream Moisture

Moisture Vapor, V_{w(std)}

1.061 scf

Moisture, B_{ws}

0.0251

Moisture EPA M4

2.51 %v

Moisture @ Saturation

NA %v (for Ts ≤ 212°F)

EPA Method 3 Gas Density

Dry, M_d

29.05 lb/lb-mole

Wet, M_s

28.77 lb/lb-mole

Percent Isokinetic

99.4 %

EPA Method 2 Stack Gas Flowrate:

Velocity, V_s 48.44 fps

Volume (actual) 30,689 acfm

Volume (standard) 29,919 adcfm

1,318,256 wscf/hr 1,285,168 dscf/hr

21,419 dscf/min 21,971 wscfm

Isokinetic Field Data**Field Data and Calculations****Particulate Emissions and Gas Stream Characteristics**

Client: Tucson Iron and Metals	Run: 3
Location: Tucson, AZ	Start Time: 12:51
Source: Contraband incinerator	End Time: 13:56
Method: 23	Date: 03/16/21

Sampling Data				Traverse Data			
Time min.	Meter ft ³	ΔH °H ₂ O	Meter T _m °F	Traverse Point	Dp °H ₂ O	Stack T _s °F	√Dp
	639.550						
3.0	641.400	1.15	60	1	0.35	210	0.592
6.0	643.270	1.15	60	2	0.35	210	0.592
9.0	645.030	1.00	60	3	0.30	208	0.548
12.0	648.030	3.25	61	4	1.00	209	1.000
15.0	650.970	2.80	60	5	0.85	200	0.922
18.0	653.620	2.30	61	6	0.70	199	0.837
21.0	656.140	2.10	61	7	0.65	205	0.806
24.0	658.550	1.95	61	8	0.60	206	0.775
27.0	661.010	2.02	61	9	0.62	206	0.787
30.0	663.457	1.95	62	10	0.60	206	0.775
33.0	666.000	2.10	62	11	0.65	209	0.806
36.0	668.530	2.00	61	12	0.62	210	0.787
39.0	670.940	1.95	62	13	0.60	212	0.775
42.0	673.380	2.00	62	14	0.62	213	0.787
45.0	675.780	1.90	62	15	0.59	212	0.768
48.0	678.420	2.30	62	16	0.71	213	0.843
51.0	681.030	2.30	62	17	0.70	213	0.837
54.0	683.690	2.40	62	18	0.73	212	0.854
57.0	686.380	2.35	63	19	0.71	212	0.843
60.0	688.352	1.30	62	20	0.40	209	0.632

Client: Tucson Iron and Metals
Source: Contraband incinerator

Run: 3
Date: 03/16/21

Field Data Input Continued

<u>Moisture Data</u>		<u>Stack Dimensional Data:</u>	
Total Test Time	60.0 min	Circular	
Sample Time Interval	3.0 min	Diameter	44.000 in
Meter Volume, V _m	48.802 dcf	Rectangular	
Water Volume	23.6 g	Width	in
Nozzle Diameter, N _z	0.250 in.	Length	in
Nozzle Area	0.000341 sq.ft.	Stack Area	10.559 sq.ft.

Traverse Data Molecular Weight:

Barometric Pressure, P _b	27.29 "Hg	CO ₂ Average	1.95 %vd
Static Pressure	0.32 "H ₂ O	O ₂ Average	18.80 %vd
Pitot Factor, cp	0.84		
Meter Cal Factor	0.985 Y		

Field Data Averages

<u>Meter</u>		<u>Stack</u>	
ΔH	2.014 "H ₂ O	√D _p	0.778 "H ₂ O
Temperature, T _m	61.4 °F	Temperature, T _s	208.7 °F
Temperature, T _m	521.4 °A (°R)	Temperature, T _s	668.7 °A (R)
Pressure Meter, P _m	27.438 "Hg	Pressure Stack, P _s	27.314 "Hg

Field Data Calculations

Meter Box Capture

Standard Volume, V_{m(std)}

44.612 dscf

1.263 dscm

Actual Volume, V_{m(actual)}

63.472 awcf

EPA Method 2 Stack Gas Flowrate:

Velocity, V_s 51.52 fps

Volume (actual) 32,640 acfm

31,847 adcfm

Volume (standard) 1,410,769 wscf/hr

1,376,487 dscf/hr

Moisture Vapor, V_{w(std)}

1.111 scf

Moisture, B_{ws}

0.0243

Moisture EPA M4

2.43 %v

Moisture @ Saturation

102.56 %v (for Ts ≤ 212°F)

22,941 dscf/min

23,513 wscfm

EPA Method 3 Gas Density

Dry, M_d

29.06 lb/lb-mole

Wet, M_s

28.79 lb/lb-mole

Percent Isokinetic

100.4 %

EPA Method 23**Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans****Laboratory Results**Client: Tucson Iron and Metals Run 1 O₂: 18.56 %Location: Tucson, AZ O₂ corrected to: 7.0 %

Source: Contraband incinerator

Run: 1

Analyte Name	Lab Result (pg)	Total Basis			TEQ Basis				
		Calculated/Adjusted Results			Calculated/Adjusted Results				
		Lab Result (ng)	O ₂ Corrected (ng)	O ₂ Corrected (ng/dscm)	TEF*	TEF Adjusted	Result (pg)	ng	O ₂ Corrected ng
2,3,7,8-TCDD	13.7	0.01	0.08	0.07	1	13.7	1.37E-02	8.14E-02	7.18E-02
1,2,3,7,8-PeCDD	64.8	0.06	0.38	0.34	1	64.8	6.48E-02	3.85E-01	3.39E-01
1,2,3,4,7,8-HxCDD	33.9	0.03	0.20	0.18	0.1	3.39	3.39E-03	2.01E-02	1.78E-02
1,2,3,6,7,8-HxCDD	69.0	0.07	0.41	0.36	0.1	6.90	6.90E-03	4.10E-02	3.61E-02
1,2,3,7,8,9-HxCDD	50.7	0.05	0.30	0.27	0.1	5.07	5.07E-03	3.01E-02	2.66E-02
1,2,3,4,6,7,8-HpCDD	888	0.89	5.27	4.65	0.01	8.88	8.88E-03	5.27E-02	4.65E-02
OCDD	7,190	7.19	42.71	37.66	0.0003	2.16	2.16E-03	1.28E-02	1.13E-02
2,3,7,8-TCDF	31.8	0.03	0.19	0.17	0.1	3.18	3.18E-03	1.89E-02	1.67E-02
1,2,3,7,8-PeCDF	187	0.19	1.11	0.98	0.03	5.61	5.61E-03	3.33E-02	2.94E-02
2,3,4,7,8-PeCDF	316	0.32	1.88	1.66	0.3	94.8	9.48E-02	5.63E-01	4.97E-01
1,2,3,4,7,8-HxCDF	299	0.30	1.78	1.57	0.1	29.9	2.99E-02	1.78E-01	1.57E-01
1,2,3,6,7,8-HxCDF	454	0.45	2.70	2.38	0.1	45.4	4.54E-02	2.70E-01	2.38E-01
1,2,3,7,8,9-HxCDF	56.1	0.06	0.33	0.29	0.1	5.61	5.61E-03	3.33E-02	2.94E-02
2,3,4,6,7,8-HxCDF	223	0.22	1.32	1.17	0.1	22.3	2.23E-02	1.32E-01	1.17E-01
1,2,3,4,6,7,8-HpCDF	2,300	2.30	13.66	12.05	0.01	23.0	2.30E-02	1.37E-01	1.20E-01
1,2,3,4,7,8,9-HpCDF	77.7	0.08	0.46	0.41	0.01	0.777	7.77E-04	4.62E-03	4.07E-03
OCDF	4,600	4.60	27.32	24.10	0.0003	1.38	1.38E-03	8.20E-03	7.23E-03
Totals:	16,855	16.85	100.12	88.29		337	0.34	2.00	1.76

*2,3,7,8-TCDD Toxic Equivalence Factors, 2005 WHO.

Method 23, Section 9.9: any values reported as nondetected (ND) shall be counted as zero for the purpose of calculating total concentrations

EPA Method 23

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans

Laboratory Results

Client: Tucson Iron and Metals Run 2 O₂: 18.81 %
 Location: Tucson, AZ O₂ corrected to: 7.0 %

Source: Contraband incinerator

Run: 2

Analyte Name	Lab Result (pg)	Total Basis			TEQ Basis				
		Calculated/Adjusted Results			TEF*	TEF Adjusted Result (pg)	ng	O ₂ Corrected ng	O ₂ Corrected ng/dscm
		Lab Result (ng)	O ₂ Corrected (ng)	O ₂ Corrected (ng/dscm)					
2,3,7,8-TCDD	ND				1				
1,2,3,7,8-PeCDD	47.2	0.05	0.31	0.27	1	47.2	4.72E-02	3.14E-01	2.69E-01
1,2,3,4,7,8-HxCDD	27.9	0.03	0.19	0.16	0.1	2.79	2.79E-03	1.86E-02	1.59E-02
1,2,3,6,7,8-HxCDD	24.6	0.02	0.16	0.14	0.1	2.46	2.46E-03	1.64E-02	1.40E-02
1,2,3,7,8,9-HxCDD	16.7	0.02	0.11	0.10	0.1	1.67	1.67E-03	1.11E-02	9.51E-03
1,2,3,4,6,7,8-HpCDD	80.3	0.08	0.53	0.46	0.01	0.803	8.03E-04	5.34E-03	4.57E-03
OCDD	352	0.35	2.34	2.00	0.0003	0.106	1.06E-04	7.02E-04	6.01E-04
2,3,7,8-TCDF	ND				0.1				
1,2,3,7,8-PeCDF	175	0.18	1.16	1.00	0.03	5.25	5.25E-03	3.49E-02	2.99E-02
2,3,4,7,8-PeCDF	315	0.32	2.09	1.79	0.3	94.5	9.45E-02	6.28E-01	5.38E-01
1,2,3,4,7,8-HxCDF	252	0.25	1.68	1.43	0.1	25.2	2.52E-02	1.68E-01	1.43E-01
1,2,3,6,7,8-HxCDF	222	0.22	1.48	1.26	0.1	22.2	2.22E-02	1.48E-01	1.26E-01
1,2,3,7,8,9-HxCDF	43.2	0.04	0.29	0.25	0.1	4.32	4.32E-03	2.87E-02	2.46E-02
2,3,4,6,7,8-HxCDF	145	0.15	0.96	0.83	0.1	14.5	1.45E-02	9.64E-02	8.26E-02
1,2,3,4,6,7,8-HpCDF	433	0.43	2.88	2.47	0.01	4.33	4.33E-03	2.88E-02	2.47E-02
1,2,3,4,7,8,9-HpCDF	49.0	0.05	0.33	0.28	0.01	0.490	4.90E-04	3.26E-03	2.79E-03
OCDF	147	0.15	0.98	0.84	0.0003	0.0441	4.41E-05	2.93E-04	2.51E-04
Totals:	2,330	2.33	15.50	13.27		226	0.23	1.50	1.29

*2,3,7,8-TCDD Toxic Equivalence Factors, 2005 WHO.

Method 23, Section 9.9: any values reported as nondetected (ND) shall be counted as zero for the purpose of calculating total concentrations

EPA Method 23

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans

Laboratory Results

Client: Tucson Iron and Metals Run 3 O₂: 18.80 %Location: Tucson, AZ O₂ corrected to: 7.0 %

Source: Contraband incinerator

Run: 3

Analyte Name	Total Basis			TEQ Basis				
	Lab Result (pg)	Calculated/Adjusted Results			Calculated/Adjusted Results			
		Lab Result (ng)	O ₂ Corrected (ng)	O ₂ Corrected (ng/dscm)	TEF*	TEF Adjusted Result (pg)	ng	O ₂ Corrected ng
2,3,7,8-TCDD	37.6	0.04	0.25	0.20	1	37.60	3.76E-02	2.49E-01
1,2,3,7,8-PeCDD	75.1	0.08	0.50	0.39	1	75.10	7.51E-02	4.97E-01
1,2,3,4,7,8-HxCDD	37.3	0.04	0.25	0.20	0.1	3.73	3.73E-03	2.47E-02
1,2,3,6,7,8-HxCDD	56.0	0.06	0.37	0.29	0.1	5.60	5.60E-03	3.71E-02
1,2,3,7,8,9-HxCDD	41.9	0.04	0.28	0.22	0.1	4.19	4.19E-03	2.77E-02
1,2,3,4,6,7,8-HpCDD	790	0.79	5.23	4.14	0.01	7.90	7.90E-03	5.23E-02
OCDD	9,270	9.27	61.36	48.58	0.0003	2.78	2.78E-03	1.84E-02
2,3,7,8-TCDF	129	0.13	0.85	0.68	0.1	12.90	1.29E-02	8.54E-02
1,2,3,7,8-PeCDF	259	0.26	1.71	1.36	0.03	7.77	7.77E-03	5.14E-02
2,3,4,7,8-PeCDF	437	0.44	2.89	2.29	0.3	131.10	1.31E-01	8.68E-01
1,2,3,4,7,8-HxCDF	353	0.35	2.34	1.85	0.1	35.30	3.53E-02	2.34E-01
1,2,3,6,7,8-HxCDF	361	0.36	2.39	1.89	0.1	36.10	3.61E-02	2.39E-01
1,2,3,7,8,9-HxCDF	84.2	0.08	0.56	0.44	0.1	8.42	8.42E-03	5.57E-02
2,3,4,6,7,8-HxCDF	239	0.24	1.58	1.25	0.1	23.90	2.39E-02	1.58E-01
1,2,3,4,6,7,8-HpCDF	1,140	1.14	7.55	5.97	0.01	11.40	1.14E-02	7.55E-02
1,2,3,4,7,8,9-HpCDF	90.3	0.09	0.60	0.47	0.01	0.90	9.03E-04	5.98E-03
OCDF	1,000	1.00	6.62	5.24	0.0003	0.30	3.00E-04	1.99E-03
Totals:	14,400	14.40	95.32	75.47		405	0.40	2.68
								2.12

*2,3,7,8-TCDD Toxic Equivalence Factors, 2005 WHO.

Method 23, Section 9.9: any values reported as nondetected (ND) shall be counted as zero for the purpose of calculating total concentrations

EPA Method 23

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans

Results Summary

Client: Tucson Iron and Metals
Source: Contraband incinerator
Location: Tucson, AZ

Run	1	2	3			
Date	3/16/2021	3/16/2021	3/16/2021			
Run Start Time	9:50	11:26	12:51			
Run End Time	10:55	12:34	13:56			
Duration, min.	60	60	60	Average		
Barometric Pressure, "Hg	27.24	27.28	27.29	27.27		
Nozzle Dia., in.	0.250	0.250	0.250	0.250		
Isokinetic Average, %	101.9	99.4	100.4	100.6		
Sample Volume, dscf	40.049	41.264	44.612	41.975		
Sample Volume, dscm	1.134	1.168	1.263	1.188		
Stack Diameter, in.	44.00	44.00	44.00	44.00		
Stack Area, sq.ft.	10.559	10.559	10.559	10.559		
CO ₂ %vd	2.15	1.83	1.95	1.98		
O ₂ %vd	18.56	18.81	18.80	18.72		
Static Press., "H ₂ O	0.32	0.32	0.32	0.32		
H ₂ O %v	3.98	2.51	2.43	2.97		
Wet Molecular Weight, lb/lb-mole	28.65	28.77	28.79	28.74		
Velocity, FPS	46.37	48.44	51.52	48.78		
ADCFM	28,208	29,919	31,847	29,991		
ACFM	29,377	30,689	32,640	30,902		
DSCFM	20,289	21,419	22,941	21,550		
Stack Temperature, °F	208.5	212.6	208.7	209.9		
Dioxins/Furans (Total Basis)	Totals	pg	16,855	2,330	14,400	11,195
		ng	17	2	14	11
	O ₂ Corrected	ng	100	15	95	70
	Totals*	ng/dscm	88	13	75	59
Dioxins/Furans (TEQ** Basis)	TEF Adjusted	pg	337	226	405	323
	Totals	ng	0.34	0.23	0.40	0.32
	O ₂ Corrected	ng	2.00	1.50	2.68	2.06
	Totals*	ng/dscm	1.76	1.29	2.12	1.72

*Corrected to 7 % O₂

**TEQ - Toxic equivalence basis

EPA Methods 1-4, 23
Example Calculations

Client: Tucson Iron and Metals
Location: Tucson, AZ
Source: Contraband incinerator
Method: 23

Run: 1
Start Time: 9:50
End Time: 10:55
Date: 3/16/2021

EPA Methods 1-4:

$$1) P_m = Pb + (\Delta H/13.6) = \quad 27.363 \text{ "Hg}$$

where Pb: 27.24 "Hg
 ΔH : 1.667 "H₂O

$$2) P_s = Pb + (\text{Static Press.}/13.6) = \quad 27.264 \text{ "Hg}$$

where Pb: 27.24 "Hg
 Static Press.: 0.32 "H₂O

$$3) V_m(\text{std}) = V_m(527.67/29.92)(Y)\left(\frac{P_m}{T_m}\right) = \quad 40.049 \text{ dscf}$$

where V_m: 43.618 dcf
 Y : 0.9850
 P_m: 27.363 "Hg
 T_m: 517.7 °A

$$4) V_w(\text{std}) = (0.04716)(H_2O) = \quad 1.660 \text{ scf}$$

where H₂O: 35.2 g

$$5) B_{ws} = \left(\frac{V_w(\text{std})}{V_w(\text{std}) + V_m(\text{std})} \right) = \quad 0.0398$$

where V_w(std): 1.660 scf
 V_m(std): 40.049 dscf

$$6) \% H_2O = B_{ws} \times 100 = \quad 3.98 \%v$$

$$7) V_m(\text{actual}) = \left(\frac{Y \times V_m}{(1 - B_{ws})} \right) \left(\frac{T_s}{T_m} \right) \left(\frac{P_m}{P_s} \right) = \quad 57.988 \text{ awcf}$$

where Y: 0.9850
 V_m: 43.6180 dcf
 B_{ws}: 0.0398
 T_s : 668.5 °A
 T_m: 517.7 °A
 P_m: 27.363 "Hg
 P_s: 27.264 "Hg

$$8) M_d = 0.44(CO_2) + 0.32(O_2) + 0.28(N_2 + CO) = \quad 29.09 \text{ lb/lb-mole}$$

where CO₂: 2.15 %vd
 O₂: 18.56 %vd
 N₂+CO= (100-(O₂+CO₂)): 79.29 %vd

**Client: Tucson Iron and Metals
Source: Contraband incinerator**

**Run: 1
Date: 3/16/2021**

- 9) $M_s = M_d(1 - Bws) + (18 \times Bws) =$ 28.65 lb/lb-mole
where $M_d:$ 29.09 lb/lb-mole
 $Bws:$ 0.0398
- 10) Stack Area(cir.) = $3.1416 (\text{stack diameter}/24)^2 =$ 10.559 sq. ft.
where Stack ID: 44 inches
- Stack Area(rect.) = stack width/12 x stack length/12 = NA sq. ft.
where Stack Width: 0.000 inches
Stack Length: 0.000 inches
- 11) Velocity, $V_s = 85.49(Cp)(\text{Ave. Sqrt } \Delta P) \left(\sqrt{\frac{T_s}{(P_s \times M_s)}} \right) =$ 46.37 fps
where $Cp:$ 0.84
Ave. Sqrt $\Delta P:$ 0.6980
 $T_s:$ 668.5 °A
 $P_s:$ 27.264 "Hg
 $M_s:$ 28.65 lb/lb-mole
- 12) ACFM = $(V_s)(\text{stack area})(60 \text{ sec/min}) =$ 29,377 ACFM
where $V_s:$ 46.37 ft/sec
Stack Area: 10.559 sq. ft
- 13) ADCFM = $(ACFM)(1-Bws) =$ 28,208 ADCFM
where ACFM: 29,377.0
 $Bws:$ 0.0398
- 14) $Q_{sw} = 3600(V_s)(\text{stack area}) \left(\frac{528^\circ A}{T_s} \right) \left(\frac{P_s}{29.92 \text{ "Hg}} \right) =$ 1,267,802 wscf/hr
where $V_s:$ 46.37 ft/sec
Stack Area: 10.5590 sq. ft.
 $T_s:$ 668.5 °A
 $P_s:$ 27.264 "Hg
- 15) $Q_{sd} = (\text{wscf/hr})(1-Bws) =$ 1,217,343 dscf/hr
where wscf/hr: 1,267,802.0
 $Bws:$ 0.0398
- 16) DSCFM= $(dscf/hr)/60 \text{ mins/hr} =$ 20,289 DSCFM
where dscf/hr: 1,217,343.0
- 17) Nozzle Area = $3.1416 (\text{Nozzle Size}/24)^2 =$ 0.000341 sq. ft.
where Nozzle Size: 0.250 inches

Client: Tucson Iron and Metals
Source: Contraband incinerator

Run: 1
Date: 3/16/2021

$$18) \text{ Isokinetic \%} = \left(\frac{0.0945(T_s)(V_m(\text{std}))}{P_s(V_s)(\text{nozzle area})(\text{sampling time})(1-B_{ws})} \right) = 101.9 \%$$

where T_s : 668.5 °A
 $V_m(\text{Std})$: 40.049 dscf
 P_s : 27.264 "Hg
 V_s : 46.37 ft/sec
Nozzle Area: 0.000341 sq. ft.
Sampling Time: 60 min.
 B_{ws} : 0.0398

EPA Method 23:

Ex. Run 1, 2,3,7,8-TCDD

$$19) \text{ Run 1 Lab result (ng)} = \text{result pg} \times 0.001 = 0.01 \text{ ng}$$

where result pg: 13.7 pg

$$20) O_2 \text{ corrected ng} = \text{ng} * (20.9 - O_2 \text{ correction}) / (20.9 - \text{Run 1 } O_2) = 0.08 \text{ ng}$$

where ng: 1.37E-02 ng
 O_2 Correction: 7.0 %
Run 1 O_2 : 18.56 %

$$21) \text{ ng/dscm} = O_2 \text{ corrected ng} / \text{sample volume} = 0.07 \text{ ng/dscm}$$

where O_2 corrected ng: 0.08 ng
Sample volume: 1.134 dscm

$$22) \text{ TEF Adjusted Result} = \text{TEF value} * \text{lab result pg} = 13.7 \text{ pg}$$

where 1,2,3,7,8-TCDD TEF: 1.0
Run 1 result: 13.70 pg

APPENDIX B: GASEOUS DATA

Bison Engineering, Inc.
Gaseous Testing Summary

Client:	Tucson Iron and Metals	Source:	Contraband Incinerator
Facility:	Tucson, Arizona	Test Date:	March 16, 2021
Location:	Tucson, Arizona		

Environmental Conditions / Test Notes: 50-80 degrees Fahrenheit.

Run	1	2	3	Average
Date	3/16/2021	3/16/2021	3/16/2021	
Run Start Time	9:50	11:26	12:51	
Run End Time	10:55	12:34	13:56	
Duration, min.	66	69	66	
CO ₂ , %vd	2.14	1.81	1.93	1.96
O ₂ , %vd	18.57	18.82	18.83	18.74

Bison Engineering, Inc.

Method 3A Oxygen

Calibration Error, System Bias and System Drift

Client: Tucson Iron and Metals	Source: Contraband Incinerator	Instrument Make: Servomex
Facility: Tucson, Arizona	Date: March 16, 2021	Instrument Model: 1440
Location: Tucson, Arizona		Instrument Serial #: 01440D1/3855

	Analyzer Cal. Response	Initial Values			Final Values			System Drift % of span	Analyzer Span	Raw Avg Gas Conc	Corrected Gas Conc	Instrument Cal. Reference Gas
		System Cal Response	Pre test System Cal. Bias % of span	pass/fail	System Cal Response	Post test System Cal. Bias % of span	pass/fail					
Run 1	zero	0.01	0.06	0.25	pass	0.07	0.30	pass	0.05	pass		
	upscale	10.09	10.04	-0.25	pass	10.07	-0.10	pass	0.15	pass	19.96	18.56
Run 2	zero	0.01	0.07	0.30	pass	0.08	0.35	pass	0.05	pass		
	upscale	10.09	10.07	-0.10	pass	10.05	-0.20	pass	0.10	pass	19.96	18.81
Run 3	zero	0.01	0.08	0.35	pass	0.08	0.35	pass	0.00	pass		
	upscale	10.09	10.05	-0.20	pass	10.05	-0.20	pass	0.00	pass	19.96	18.80
				< 5%*			< 5%*		< 3%*			

Analyzer Calibration Error	Zero	Mid	High
Calibration Gas Standards	0	10.03	19.96
Cylinder Number		DT0027824	DT0029914
Calibration Gas Analyzer Response	0.01	10.09	20
Analyzer Calibration Error	0.05	0.30	0.20
Analyzer Calibration Error < 2%*	pass	pass	pass

System Response Time	
60	seconds

Note: All units are in %

*Or < 0.5 % absolute difference

Bison Engineering, Inc.

Method 3A CO₂

Calibration Error, System Bias and System Drift

Client: Tucson Iron and Metals	Source: Contraband Incinerator	Instrument Make: Servomex
Facility: Tucson, Arizona	Date: March 16, 2021	Instrument Model: 1440
Location: Tucson, Arizona		Instrument Serial #: 01440DL/3855

		Initial Values				Final Values				Analyzer Span	Raw Avg Gas Conc	Corrected Gas Conc	Instrument Cal. Reference Gas				
Run	Analyzer Cal. Response	System Cal Response	Pre test		System Cal Response	Post test		System Drift									
		% of span	System Cal. Bias	pass/fail	% of span	System Cal. Bias	pass/fail	% of span	pass/fail								
Run 1	zero	0.00	0.01	0.05	pass	0.01	0.05	pass	0.00	pass	19.86	2.15	2.14	10.03			
	upscale	10.11	10.05	-0.30	pass	10.06	-0.25	pass	0.05	pass							
Run 2	zero	0.00	0.01	0.05	pass	0.01	0.05	pass	0.00	pass	19.86	1.83	1.81	10.03			
	upscale	10.11	10.06	-0.25	pass	10.09	-0.10	pass	0.15	pass							
Run 3	zero	0.00	0.01	0.05	pass	0.01	0.05	pass	0.00	pass	19.86	1.95	1.93	10.03			
	upscale	10.11	10.09	-0.10	pass	10.09	-0.10	pass	0.00	pass							
< 5%*				< 5%*				< 3%*									

Analyzer Calibration Error	Zero	Mid	High
Calibration Gas Standards	0	10.03	19.86
Cylinder Number		DT0027824	DT0029914
Calibration Gas Analyzer Response	0	10.11	19.87
Analyzer Calibration Error	0.00	0.40	0.05
Analyzer Calibration Error < 2%*	pass	pass	pass

System Response Time	
60	seconds

Note: All units are in %

*Or < 0.5 % absolute difference

Stratification Check

Client:	Tucson Iron and Metals	Source:	Contraband Incinerator
Facility:	Tucson, Arizona	Test Date:	March 16, 2021
Location:	Tucson, Arizona		

Stack Diamete: 44 inches
Port Depth: 4 inches

3 POINT METHOD					
% of diameter	Pt	Pt location	O2%	Diff (+/- 5%)	Pass/Fail
16.7%	S1	11.35	18.55	-0.05%	PASS
50.0%	S2	26.00	18.68	0.65%	PASS
83.3%	S3	40.65	18.45	-0.59%	PASS
		AVERAGE:	18.56		

EPA Method 3A, Example Calculations

Client: **Tucson Iron and Metals**
 Location: **Tucson, Arizona**
 Source: **Contraband Incinerator**

Run: **1**
 Start Time: **9:50**
 End Time: **10:55**
 Date: **3/16/2021**

EPA Method 3A (O_2):

Analyzer Calibration Error (Mid)

$$1) \text{ ACE} = \left(\frac{C_{\text{Dir}} - C_V}{C_S} \right) \times 100 = 0.30 \%v$$

where C_{Dir} : 10.09 %
 C_V : 10.03 %
 C_S : 19.96 %

System Bias (Upscale)

$$2) \text{ SB} = \left(\frac{C_S - C_{\text{Dir}}}{C_S} \right) \times 100 = -0.25 \%v$$

where C_{Dir} : 10.09 %
 C_S : 10.04 %
 C_S : 19.96 %

Drift Assessment (Upscale)

$$3) D = | SB_{\text{Final}} - SB_i | = 0.15 \%v$$

where SB_{Final} : -0.10 %
 SB_i : -0.25 %

Effluent Gas Concentration

$$4) C_{\text{Gas}} = (C_{\text{Avg}} - C_O) \left(\frac{C_{\text{MA}}}{C_M - C_O} \right) = 18.57 \%v$$

where C_{Avg} : 18.56 %
 C_O : 0.07 %
 C_{MA} : 10.03 %
 C_M : 10.06 %

EPA Method 3A, Example Calculations

Client: **Tucson Iron and Metals**
Location: **Tucson, Arizona**
Source: **Contraband Incinerator**

Run: **1**
Start Time: **9:50**
End Time: **10:55**
Date: **3/16/2021**

EPA Method 3A (CO₂):

Analyzer Calibration Error (Mid)

$$1) \text{ ACE} = \left(\frac{C_{\text{Dir}} - C_V}{C_S} \right) \times 100 = 0.40 \%v$$

where C_{Dir} : 10.11 %
 C_V : 10.03 %
 C_S : 19.86 %

System Bias (Upscale)

$$2) \text{ SB} = \left(\frac{C_S - C_{\text{Dir}}}{C_S} \right) \times 100 = -0.30 \%v$$

where C_{Dir} : 10.11 %
 C_S : 10.05 %
 C_S : 19.86 %

Drift Assessment (Upscale)

$$3) D = | SB_{\text{Final}} - SB_i | = 0.05 \%v$$

where SB_{Final} : -0.25 %
 SB_i : -0.30 %

Effluent Gas Concentration

$$4) C_{\text{Gas}} = (C_{\text{Avg}} - C_O) \left(\frac{C_{\text{MA}}}{C_M - C_O} \right) = 2.14 \%v$$

where C_{Avg} : 2.15 %
 C_O : 0.01 %
 C_{MA} : 10.03 %
 C_M : 10.06 %

**Tucson Iron & Metals
Contraband Incinerator
Calibration and Run Data**

Date	Time	O2 [%]	CO2 [%]
3/16/2021	7:30:05	19.39	0.09
3/16/2021	7:31:05	1.11	0.04
3/16/2021	7:32:05	-0.01	0.00
3/16/2021	7:33:05	-0.01	-0.01
3/16/2021	7:34:05	-0.03	0.00
3/16/2021	7:35:05	-0.02	0.00
3/16/2021	7:36:05	0.02	-0.01
3/16/2021	7:37:05	0.01	0.00
			Analyzer Zero
3/16/2021	7:38:05	0.00	0.01
3/16/2021	7:39:05	17.25	19.18
3/16/2021	7:40:05	19.96	20.39
3/16/2021	7:41:05	19.99	19.85
3/16/2021	7:42:05	20.00	19.87
			O2/CO2 Analyzer Span
3/16/2021	7:43:05	14.18	12.97
3/16/2021	7:44:05	10.11	10.13
3/16/2021	7:45:05	10.10	10.12
3/16/2021	7:46:05	10.09	10.11
			O2/CO2 Analyzer Mid
3/16/2021	7:47:05	10.09	10.06
3/16/2021	7:48:05	17.70	2.17
			Waiting for Contraband
3/16/2021	8:33:05	0.07	0.02
3/16/2021	8:34:05	0.06	0.01
			System Zero
3/16/2021	8:35:05	6.59	2.82
3/16/2021	8:36:05	11.41	8.71
3/16/2021	8:37:05	10.05	10.04
3/16/2021	8:38:05	10.04	10.05
			O2/CO2 System Upscale
3/16/2021	8:39:05	11.62	7.26
3/16/2021	8:40:05	14.88	3.43
			Setup of M23 Equipment
3/16/2021	9:30:05	18.86	1.76
3/16/2021	9:31:05	18.86	1.75
3/16/2021	9:32:05	18.87	1.76
			Stratification Check
3/16/2021	9:33:05	18.75	1.87
3/16/2021	9:34:05	18.59	2.03
3/16/2021	9:35:05	18.56	2.08
3/16/2021	9:36:05	18.49	2.15
			S1 18.55
3/16/2021	9:37:05	18.46	2.18
3/16/2021	9:38:05	18.42	2.23
3/16/2021	9:39:05	18.81	1.84

**Tucson Iron & Metals
Contraband Incinerator
Calibration and Run Data**

Date	Time	O2 [%]	CO2 [%]	
3/16/2021	9:40:05	18.64	2.12	
3/16/2021	9:41:05	18.58	2.12	S2
3/16/2021	9:42:05	18.41	2.27	
3/16/2021	9:43:05	18.57	2.12	
3/16/2021	9:44:05	18.55	2.16	
3/16/2021	9:45:05	18.38	2.28	
3/16/2021	9:46:05	18.43	2.23	S3
3/16/2021	9:47:05	18.42	2.23	
3/16/2021	9:48:05	18.49	2.15	
3/16/2021	9:49:05	18.49	2.15	
3/16/2021	9:50:05	18.54	2.08	Start Run 1
3/16/2021	9:51:05	18.48	2.13	
3/16/2021	9:52:05	18.42	2.15	
3/16/2021	9:53:05	18.40	2.15	
3/16/2021	9:54:05	18.38	2.15	
3/16/2021	9:55:05	18.39	2.13	
3/16/2021	9:56:05	18.34	2.18	
3/16/2021	9:57:05	18.41	2.09	
3/16/2021	9:58:05	18.70	1.84	
3/16/2021	9:59:05	18.94	1.69	
3/16/2021	10:00:05	18.97	1.71	
3/16/2021	10:01:05	18.99	1.73	
3/16/2021	10:02:05	18.72	2.00	
3/16/2021	10:03:05	18.65	2.08	
3/16/2021	10:04:05	18.60	2.13	
3/16/2021	10:05:05	18.55	2.19	
3/16/2021	10:06:05	18.65	2.10	
3/16/2021	10:07:05	18.81	1.98	
3/16/2021	10:08:05	18.65	2.09	
3/16/2021	10:09:05	18.61	2.13	
3/16/2021	10:10:05	18.61	2.11	
3/16/2021	10:11:05	18.70	2.04	
3/16/2021	10:12:05	18.75	2.02	
3/16/2021	10:13:05	18.58	2.17	
3/16/2021	10:14:05	18.49	2.25	
3/16/2021	10:15:05	18.42	2.32	
3/16/2021	10:16:05	18.40	2.35	
3/16/2021	10:17:05	18.42	2.32	

**Tucson Iron & Metals
Contraband Incinerator
Calibration and Run Data**

Date	Time	O2 [%]	CO2 [%]
3/16/2021	10:18:05	18.44	2.32
3/16/2021	10:19:05	18.43	2.30
3/16/2021	10:20:05	18.51	2.37
3/16/2021	10:21:05	18.32	2.47
3/16/2021	10:22:05	18.44	2.36
3/16/2021	10:23:05	18.59	2.15
3/16/2021	10:24:05	18.72	2.00
3/16/2021	10:25:05	18.86	1.86
3/16/2021	10:26:05	18.78	1.96
3/16/2021	10:27:05	18.71	2.03
3/16/2021	10:28:05	18.53	2.17
3/16/2021	10:29:05	18.40	2.30
3/16/2021	10:30:05	18.37	2.40
3/16/2021	10:31:05	18.33	2.43
3/16/2021	10:32:05	18.90	1.84
3/16/2021	10:33:05	18.53	2.25
3/16/2021	10:34:05	18.57	2.14
3/16/2021	10:35:05	18.73	1.98
3/16/2021	10:36:05	18.71	1.99
3/16/2021	10:37:05	18.62	2.07
3/16/2021	10:38:05	18.69	2.00
3/16/2021	10:39:05	18.68	1.98
3/16/2021	10:40:05	18.68	1.96
3/16/2021	10:41:05	18.58	2.08
3/16/2021	10:42:05	18.50	2.18
3/16/2021	10:43:05	18.41	2.31
3/16/2021	10:44:05	18.49	2.25
3/16/2021	10:45:05	18.43	2.31
3/16/2021	10:46:05	18.47	2.28
3/16/2021	10:47:05	18.28	2.48
3/16/2021	10:48:05	18.29	2.48
3/16/2021	10:49:05	18.22	2.56
3/16/2021	10:50:05	18.15	2.63
3/16/2021	10:51:05	18.20	2.53

**Tucson Iron & Metals
Contraband Incinerator
Calibration and Run Data**

Date	Time	O2 [%]	CO2 [%]
3/16/2021	10:52:05	18.41	2.33
3/16/2021	10:53:05	18.55	2.12
3/16/2021	10:54:05	18.76	1.89
3/16/2021	10:55:05	18.95	1.69 End Run 1
		18.56	2.15 Averages
3/16/2021	10:56:05	18.90	1.75
3/16/2021	10:57:05	18.89	1.76
3/16/2021	10:58:05	18.78	1.88
3/16/2021	10:59:05	16.45	1.87
3/16/2021	11:00:05	0.69	0.06
3/16/2021	11:01:05	0.09	0.01
3/16/2021	11:02:05	0.07	0.01 System Zero
3/16/2021	11:03:05	8.17	4.25
3/16/2021	11:04:05	10.15	9.99
3/16/2021	11:05:05	10.07	10.06 O2/CO2 System Upscale
3/16/2021	11:06:05	13.05	6.42
3/16/2021	11:07:05	18.54	1.98
3/16/2021	11:08:05	18.61	1.93
3/16/2021	11:09:05	18.51	1.99
3/16/2021	11:10:05	18.53	1.98
3/16/2021	11:11:05	18.50	2.05
3/16/2021	11:12:05	18.46	2.07
3/16/2021	11:13:05	18.51	2.02
3/16/2021	11:14:05	18.58	1.97
3/16/2021	11:15:05	18.55	2.00
3/16/2021	11:16:05	18.52	2.02
3/16/2021	11:17:05	18.50	2.04
3/16/2021	11:18:05	18.47	2.07
3/16/2021	11:19:05	18.42	2.09
3/16/2021	11:20:05	18.46	2.07
3/16/2021	11:21:05	18.45	2.08
3/16/2021	11:22:05	18.50	2.02
3/16/2021	11:23:05	18.55	1.97
3/16/2021	11:24:05	18.47	2.05
3/16/2021	11:25:05	18.55	1.97

**Tucson Iron & Metals
Contraband Incinerator
Calibration and Run Data**

Date	Time	O2 [%]	CO2 [%]
3/16/2021	11:26:05	18.88	1.72
3/16/2021	11:27:05	18.92	1.73
3/16/2021	11:28:05	18.90	1.79
3/16/2021	11:29:05	18.71	1.94
3/16/2021	11:30:05	18.76	1.93
3/16/2021	11:31:05	18.62	2.02
3/16/2021	11:32:05	18.71	1.96
3/16/2021	11:33:05	18.68	1.96
3/16/2021	11:34:05	18.71	1.92
3/16/2021	11:35:05	18.74	1.87
3/16/2021	11:36:05	18.95	1.68
3/16/2021	11:37:05	19.03	1.66
3/16/2021	11:38:05	18.84	1.82
3/16/2021	11:39:05	19.07	1.58
3/16/2021	11:40:05	19.07	1.60
3/16/2021	11:41:05	19.14	1.53
3/16/2021	11:42:05	19.38	1.34
3/16/2021	11:43:05	19.37	1.31
3/16/2021	11:44:05	19.65	1.04
3/16/2021	11:45:05	19.80	0.91
3/16/2021	11:46:05	19.90	0.86
3/16/2021	11:47:05	19.87	0.88
3/16/2021	11:48:05	19.78	0.91
3/16/2021	11:49:05	19.38	1.38
3/16/2021	11:50:05	19.07	1.65
3/16/2021	11:51:05	18.83	1.82
3/16/2021	11:52:05	18.84	1.80
3/16/2021	11:53:05	18.76	1.84
3/16/2021	11:54:05	18.75	1.86
3/16/2021	11:55:05	18.59	1.98
3/16/2021	11:56:05	18.46	2.08
3/16/2021	11:57:05	18.41	2.13
3/16/2021	11:58:05	18.46	2.12
3/16/2021	11:59:05	18.55	2.05
3/16/2021	12:00:05	18.55	2.01
3/16/2021	12:01:05	18.53	2.02

**Tucson Iron & Metals
Contraband Incinerator
Calibration and Run Data**

Date	Time	O2 [%]	CO2 [%]
3/16/2021	12:02:05	18.64	1.97
3/16/2021	12:03:05	18.60	2.02
3/16/2021	12:04:05	18.67	1.93
3/16/2021	12:05:05	18.81	1.80
3/16/2021	12:06:05	18.89	1.78
3/16/2021	12:07:05	18.74	1.89
3/16/2021	12:08:05	18.51	2.10
3/16/2021	12:09:05	18.51	2.10
3/16/2021	12:10:05	18.57	2.09
3/16/2021	12:11:05	18.53	2.11
3/16/2021	12:12:05	18.51	2.10
3/16/2021	12:13:05	18.58	1.99
3/16/2021	12:14:05	18.75	1.85
3/16/2021	12:15:05	18.84	1.80
3/16/2021	12:16:05	18.60	2.01
3/16/2021	12:17:05	18.54	2.10
3/16/2021	12:18:05	18.57	2.03
3/16/2021	12:19:05	18.79	1.82
3/16/2021	12:20:05	18.83	1.82
3/16/2021	12:21:05	18.63	2.00
3/16/2021	12:22:05	18.56	2.07
3/16/2021	12:23:05	18.63	2.02
3/16/2021	12:24:05	18.75	1.91
3/16/2021	12:25:05	18.61	2.06
3/16/2021	12:26:05	18.44	2.17
3/16/2021	12:27:05	18.51	2.09
3/16/2021	12:28:05	18.73	1.87
3/16/2021	12:29:05	18.98	1.66
3/16/2021	12:30:05	18.79	1.90
3/16/2021	12:31:05	18.57	2.06
3/16/2021	12:32:05	18.52	2.07
3/16/2021	12:33:05	18.56	2.04
3/16/2021	12:34:05	18.57	2.04 End Run 2
		18.81	1.83 Averages

**Tucson Iron & Metals
Contraband Incinerator
Calibration and Run Data**

Date	Time	O2 [%]	CO2 [%]
3/16/2021	12:35:05	18.68	1.93
3/16/2021	12:36:05	18.75	1.88
3/16/2021	12:37:05	18.92	1.76
3/16/2021	12:38:05	18.99	1.69
3/16/2021	12:39:05	19.38	1.34
3/16/2021	12:40:05	18.93	1.77
3/16/2021	12:41:05	18.94	1.74
3/16/2021	12:42:05	18.79	1.87
3/16/2021	12:43:05	18.75	1.89
3/16/2021	12:44:05	18.68	1.93
3/16/2021	12:45:05	18.82	1.84
3/16/2021	12:46:05	18.59	2.05
3/16/2021	12:47:05	18.64	1.99
3/16/2021	12:48:05	18.63	2.00
3/16/2021	12:49:05	18.51	2.12
3/16/2021	12:50:05	18.61	2.03
3/16/2021	12:51:05	18.66	1.95 Start Run 3
3/16/2021	12:52:05	18.71	1.91
3/16/2021	12:53:05	18.62	1.99
3/16/2021	12:54:05	18.56	2.01
3/16/2021	12:55:05	18.73	1.82
3/16/2021	12:56:05	19.03	1.60
3/16/2021	12:57:05	18.92	1.73
3/16/2021	12:58:05	18.80	1.85
3/16/2021	12:59:05	18.57	2.08
3/16/2021	13:00:05	19.11	1.54
3/16/2021	13:01:05	19.60	1.16
3/16/2021	13:02:05	19.53	1.29
3/16/2021	13:03:05	19.16	1.60
3/16/2021	13:04:05	19.17	1.60
3/16/2021	13:05:05	18.72	2.05
3/16/2021	13:06:05	18.72	2.02
3/16/2021	13:07:05	18.73	2.02
3/16/2021	13:08:05	18.80	1.95
3/16/2021	13:09:05	18.68	2.10
3/16/2021	13:10:05	18.64	2.15

**Tucson Iron & Metals
Contraband Incinerator
Calibration and Run Data**

Date	Time	O2 [%]	CO2 [%]
3/16/2021	13:11:05	18.70	2.08
3/16/2021	13:12:05	19.00	1.76
3/16/2021	13:13:05	18.99	1.72
3/16/2021	13:14:05	19.06	1.67
3/16/2021	13:15:05	18.79	1.94
3/16/2021	13:16:05	18.66	2.05
3/16/2021	13:17:05	18.66	2.09
3/16/2021	13:18:05	18.65	2.08
3/16/2021	13:19:05	18.66	2.09
3/16/2021	13:20:05	18.61	2.13
3/16/2021	13:21:05	18.55	2.17
3/16/2021	13:22:05	18.69	2.03
3/16/2021	13:23:05	18.81	1.91
3/16/2021	13:24:05	18.68	2.08
3/16/2021	13:25:05	18.60	2.16
3/16/2021	13:26:05	18.65	2.14
3/16/2021	13:27:05	18.64	2.09
3/16/2021	13:28:05	18.63	2.09
3/16/2021	13:29:05	18.64	2.03
3/16/2021	13:30:05	18.85	1.88
3/16/2021	13:31:05	18.96	1.75
3/16/2021	13:32:05	18.97	1.76
3/16/2021	13:33:05	18.89	1.84
3/16/2021	13:34:05	18.86	1.89
3/16/2021	13:35:05	18.69	2.07
3/16/2021	13:36:05	18.73	2.06
3/16/2021	13:37:05	18.67	2.11
3/16/2021	13:38:05	18.69	2.13
3/16/2021	13:39:05	18.66	2.21
3/16/2021	13:40:05	18.81	2.00
3/16/2021	13:41:05	18.92	1.91
3/16/2021	13:42:05	18.60	2.29
3/16/2021	13:43:05	18.97	1.80
3/16/2021	13:44:05	19.27	1.50
3/16/2021	13:45:05	18.70	2.13
3/16/2021	13:46:05	18.82	1.97
3/16/2021	13:47:05	18.71	2.07
3/16/2021	13:48:05	18.59	2.15
3/16/2021	13:49:05	18.76	2.01

**Tucson Iron & Metals
Contraband Incinerator
Calibration and Run Data**

Date	Time	O2 [%]	CO2 [%]
3/16/2021	13:50:05	18.76	2.07
3/16/2021	13:51:05	18.73	2.16
3/16/2021	13:52:05	18.81	2.00
3/16/2021	13:53:05	18.88	1.93
3/16/2021	13:54:05	18.66	2.22
3/16/2021	13:55:05	18.91	1.88
3/16/2021	13:56:05	18.73	2.09 End Run 3
		18.80	1.95 Averages
3/16/2021	13:57:05	18.54	2.32
3/16/2021	13:58:05	18.44	1.95
3/16/2021	13:59:05	1.82	0.16
3/16/2021	14:00:05	0.08	0.01 System Zero
3/16/2021	14:01:05	4.36	3.83
3/16/2021	14:02:05	10.02	10.04
3/16/2021	14:03:05	10.05	10.09 O2/CO2 System Upscale
3/16/2021	14:04:05	14.61	5.00

APPENDIX C: LABORATORY REPORT



March 25, 2021

Service Request No:E2100264

Connor Everly
Bison Engineering, Incorporated
4251 S Station Master Dr
Tucson, AZ 85714

Laboratory Results for: Tucson Iron & Metals

Dear Connor,

Enclosed are the results of the sample(s) submitted to our laboratory March 17, 2021
For your reference, these analyses have been assigned our service request number **E2100264**.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current TNI standards, where applicable, and except as noted in the laboratory case narrative provided. All results are intended to be considered in their entirety, and ALS Environmental is not responsible for use of less than the final complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report. In accordance to the TNI 2009 Standard, a statement on the estimated uncertainty of measurement of any quantitative analysis will be supplied upon request.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

A handwritten signature in black ink, appearing to read "Corey Grandits".

Corey Grandits
Project Manager

ADDRESS 10450 Stancliff Rd., Suite 210, Houston, TX 77099

PHONE +1 281 530 5656 | FAX +1 281 530 5887

ALS Group USA, Corp.
dba ALS Environmental



Certificate of Analysis

ALS Environmental - Houston HRMS
10450 Stancliff Rd, Suite 210, Houston TX 77099
Phone (713)266-1599 Fax (713)266-0130
www.alsglobal.com

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Environmental

Client: Bison Eng **Service Request No.:** E2100264
Project: Tucson Iron & Metals **Date Received:** 03/17/21
Sample Matrix: A

CASE NARRATIVE

All analyses were performed in adherence to the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Four samples were received for analysis at ALS Environmental in Houston on 03/17/21.

The samples were received in good condition and are consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Data Validation Notes and Discussion

Precision and Accuracy:

EQ2100133: Laboratory Control Spike/Duplicate Laboratory Control Spike (LCS/DLCS) samples were analyzed and reported in lieu of a MS/MSD for this extraction batch. 1,2,3,4,6,7,8-HxCDD, OCDD, & OCDF recovered above QC limits in the LCS.

B flags – Method Blanks

The Method Blank EQ2100133-01 contained low levels of 1,2,3,4,7,8-HxCDD, 1,2,3,4,6,7,8-HpCDD and OCDD above the EDL however below the Method Reporting Limit (MRL). The associated compounds in the samples are flagged with 'B' flags where the sample result is less than ten times the level detected in the method blank.

Y flags – Labeled Standards

Quantification of the native 2,3,7,8-substituted congeners is based on isotopic dilution, which automatically corrects for variation in extraction efficiency and provides accurate values even with poor recovery. Samples that had recoveries of labeled standards outside the acceptance limits are qualified with 'Y' flags on the Labeled Compound summary pages. In all cases, the signal-to-noise ratios are greater than 10:1 and detection limits were below the Method Reporting Limits.

K flags

EMPC - When the ion abundance ratios associated with a particular compound are outside the QC limits, samples are flagged with a 'K' flag. A 'K' flag indicates an estimated maximum possible concentration for the associated compound.

2378-TCDF

Samples analyzed on the DB-5MSUI column were analyzed under conditions where sufficient separation between 2,3,7,8-TCDF and its closest eluter was achieved. Confirmation of this result was not required.

Detection Limits

Detection limits are calculated for each analyte in each sample by measuring the height of the noise level for each quantitation ion for the associated labeled standard. The concentration equivalent to 2.5 times the height of the noise is then calculated using the appropriate response factor and the weight of the sample. The calculated concentration equals the detection limit.

The TEQ Summary results for each sample have been calculated by ALS/Houston to include:

- WHO-2005 TEFs, The 2005 World Health Organization Reevaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-Like Compounds (M. Van den Berg et al., Toxicological Sciences 93(2):223-241, 2006)
- 2378-TCDF from the DB-225 column, when confirmation required
- Non-detected compounds are not included in the 'Total'

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.

Use of ALS group USA Corp dba ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.

Client: Bison Engineering, Incorporated
Project: Tucson Iron & Metals/TIM220419

Service Request:E2100264

SAMPLE CROSS-REFERENCE

<u>SAMPLE #</u>	<u>CLIENT SAMPLE ID</u>	<u>DATE</u>	<u>TIME</u>
E2100264-001	903-42-003 R1	3/16/2021	1100
E2100264-002	903-42-001 R2	3/16/2021	1245
E2100264-003	903-42-002 R3	3/16/2021	1400
E2100264-004	903-42-004 Blank	3/16/2021	1100

Service Request Summary

Folder #: E2100264

Client Name: Bison Engineering, Incorporated

Project Name: Tucson Iron & Metals

Project Number: TIM220419

Project Chemist: Corey Grandits

Originating Lab: HOUSTON

Logged By: CGRANDITS

Date Received: 03/17/21

Internal Due Date: 3/25/2021

QAP: LAB QAP

Qualifier Set: Lab Standard

Formset: Lab Standard

Merged?: Y

Report to MDL?: Y

P.O. Number: TIM220419

EDD: No EDD Specified

12 -N/A N/A

Location: EHRMS-WIC 3A

Pressure Gas:

Rush

Lab Samp No.	Client Samp No	Matrix	Collected	
				PCDD PCDF/23
E2100264-001	903-42-003 R1	Air	03/16/21 1100	II
E2100264-002	903-42-001 R2	Air	03/16/21 1245	II
E2100264-003	903-42-002 R3	Air	03/16/21 1400	II
E2100264-004	903-42-004 Blank	Air	03/16/21 1100	II

Service Request Summary

Folder #: **E2100264**

Client Name: Bison Engineering, Incorporated

Project Name: Tucson Iron & Metals

Project Number: TIM220419

Project Chemist: Corey Grandits

Originating Lab: HOUSTON

Logged By: CGRANDITS

Date Received: 03/17/21

Internal Due Date: 3/25/2021

QAP: LAB QAP

Qualifier Set: Lab Standard

Formset: Lab Standard

Merged?: Y

Report to MDL?: Y

P.O. Number: TIM220419

EDD: No EDD Specified

12 -N/A N/A

Location: EHRMS-WIC 3A

Pressure Gas:

Rush

Data Qualifiers

HRMS Qualifier Set

- B Indicates the associated analyte was found in the method blank at >1/10th the reported value.
- E Estimated value. The reported concentration is above the calibration range of the instrument.
- H Sample extracted and/or analyzed out of suggested holding time.
- J Estimated value. The reported concentration is below the MRL.
- K The ion abundance ratio between the primary and secondary ions were outside of theoretical acceptance limits. The concentration of this analyte should be considered as an estimate.
- P Chlorodiphenyl ether interference was present at the retention time of the target analyte. Reported result should be considered an estimate.
- Q Monitored lock-mass indicates matrix-interference. Reported result is estimated.
- S Signal saturated detector. Result reported from dilution.
- U Compound was analyzed for, but was not detected (ND).
- X See Case Narrative.
- Y Isotopically Labeled Standard recovery outside of acceptance limits. In all cases, the signal-to-noise ratios are greater than 10:1, making the recoveries acceptable.
 - i The MDL/MRL have been elevated due to a matrix interference.

ALS Laboratory Group

Acronyms

Cal	Calibration
Conc	CONCentratiOn
Dioxin(s)	Polychlorinated dibenzo-p-dioxin(s)
EDL	Estimated Detection Limit
EMPC	Estimated Maximum Possible Concentration
Flags	Data qualifiers
Furan(s)	Polychlorinated dibenzofuran(s)
g	Grams
ICAL	Initial CALibration
ID	IDentifier
Ions	Masses monitored for the analyte during data acquisition
L	Liter (s)
LCS	Laboratory Control Sample
DLCS	Duplicate Laboratory Control Sample
MB	Method Blank
MCL	Method Calibration Limit
MDL	Method Detection Limit
mL	Milliliters
MS	Matrix Spiked sample
DMS	Duplicate Matrix Spiked sample
NO	Number of peaks meeting all identification criteria
PCDD(s)	Polychlorinated dibenzo-p-dioxin(s)
PCDF(s)	Polychlorinated dibenzofuran(s)
ppb	Parts per billion
ppm	Parts per million
ppq	Parts per quadrillion
ppt	Parts per trillion
QA	Quality Assurance
QC	Quality Control
Ratio	Ratio of areas from monitored ions for an analyte
% Rec.	Percent recovery
RPD	Relative Percent Difference
RRF	Relative Response Factor
RT	Retention Time
SDG	Sample Delivery Group
S/N	Signal-to-noise ratio
TEF	Toxicity Equivalence Factor
TEQ	Toxicity Equivalence Quotient



State Certifications, Accreditations, and Licenses

Agency	Number	Expire Date
American Association for Laboratory Accreditation	2897.01 2020	11/30/2021
Arizona Department of Health Services	AZ0793-2020	5/27/2021
Arkansas Department of Environmental Quality	20-030-0	3/26/2021
California Department of Health Services	2919-2020	4/30/2021
Department of Defense	A2LA 2897.01	11/30/2021
Florida Department of Health	E87611-2020	6/30/2021
Hawaii Department of Health	2020	4/30/2021
Illinois Environmental Protection Agency	2000322020-4	5/9/2021
Kansas Department of Health and Environment	E-10352-2020	7/31/2021
Louisiana Department of Environmental Quality	03087-2020	6/30/2021
Louisiana Department of Health and Hospitals	LA028-2021	12/31/2021
Maine Department of Health and Human Services	2020016	6/5/2022
Maryland Department of the Environment	343-2020	6/30/2021
Michigan Depratment of Environmental Quality	9971-2020	4/30/2021
Nebraska Department of Health and Human Services	NE-OS-25-13 (2020)	4/30/2021
Nevada Department of Concervation and Natural Resources	TX026932021-1	7/31/2021
New Hampshire Environmental Laboratory Accreditation Program	209420	4/24/2021
New Jersey Department of Environmental Protection	TX008	6/30/2021
New York Department of Health	11707	3/31/2021
Oklahoma Department of Environmental Quality	2020-123	8/31/2021
Pennsylvania Department of Environmental Protection	014	6/30/2021
Tennessee Department of Environment and Concervation	04016-2020	4/30/2021
Texas Commision on Environmental Quality	T104704231-20-26	4/30/2021
United States Department of Agriculture	P330-19-00299	10/10/2022

ALS ENVIRONMENTAL – Houston
Data Processing/Form Production and Peer Review Signatures

SR# Unique ID

E 2100204

DB-5MSUI

SPB-Octyl

First Level - Data Processing – to be filled by person generating the forms

Date:

03/24/21

Analyst:

JC

Samples:

DO1-004

Second Level - Data Review – to be filled by person doing peer review

Date:

03/24/21

Analyst:

VM

Samples:

001-001



Chain of Custody

ALS Environmental - Houston HRMS
10450 Stancliff Rd, Suite 210, Houston TX 77099
Phone (713)266-1599 Fax (713)266-0130
www.alsglobal.com

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Chain of Custody



ALS Environmental - Tucson

ADDRESS 4208 S Santa Rita Ave, Tucson, AZ 85714

PHONE +1 520 573 1061

ALS Group USA, Corp.

REPORTING

Company Name: Bison Engineering INC.
 Contact Name: Connor Everly
 Address: 4251. S. Station Master Dr.
 City, State ZIP: TUCSON, AZ, 85715
 Email: Ceverly@Bison-eng.com Phone: (928)607-9032

CC Report to: Mseverson@Bison-eng.com

Project Name: Tucson Iron + Metals

Project Number: TIM220419

Sampler's Name: Connor Everly

SAMPLE RECEIPT

Temperature (C): _____ Temp Blank Present _____

Received Intact: Yes No N/A Wet Ice / Blue Ice

Cooler Custody Seals: Yes No N/A Total Containers:

Sample Custody Seals: Yes No N/A

Sample Identification	Matrix	Date Sampled	Time Sampled	Lab ID
-----------------------	--------	--------------	--------------	--------

R1 Filter	Filter	3/16/2021	11:00	
R2 Filter	Filter	3/16/21	12:45	
R3 Filter	Filter	3/16/21	14:00	
Blank Filter	Filter	3/16/21	11:00	
M23 R1	Acetone Toluene	3/16/21	11:00	
M23 R2	Acetone Toluene	3/16/21	12:45	
M23 R3	Acetone Toluene	3/16/21	14:00	
M23 Blank	Acetone Toluene	3/16/21	11:00	

INVOICING

AP Contact:	<u>Kay Johnson</u>	
Company:	<u>Bison Engineering INC.</u>	
Address:	<u>3143 E. Lyndale Ave Helena, MT, 59601</u>	
Email:	<u>BisonAP@Bison-eng.com</u>	Phone: <u>(406)-442-5768</u>
PO Number:	<u>TIM220419</u>	

REQUESTED ANALYSIS

TAT (circle)

same* next BD*

2BD* 3-4BD*

5BD* 6BD*

routine**
(approx.12)

* Please call for availability. Rush charges will apply.

**TAT depends on complexity of samples and analysis.

Comments

~200 mL

~200 mL

~250 mL

~200 mL

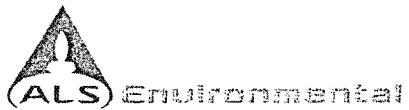
RELINQUISHED BY

Print Name	Signature	Date/Time
<u>Connor Everly</u> TIM220419	<u>Connor Everly</u>	<u>3/16/21 17:00</u>

RECEIVED BY

Print Name	Signature	Date/Time
<u>J. MACHAN</u>	<u>J. MACHAN</u>	<u>3/16/21 10:10</u>

2021 Tucson Iron and Metal Contraband Incinerator Dioxin and Furan Compliance Retest



Cooler Receipt Form

Project Chemist LSClient/Project BHVNThermometer ID 121Date/Time Received: 3/17/21Initials: JMDate/Time Logged in: 3/17/21Initials LL1. Method of delivery: US Mail Fed Ex UPS DHL Courier Client2. Samples received in: Cooler Box Envelope Other3. Were custody seals on coolers? Yes No If yes, how many and where?Were they intact? Yes No N/A

1-F

Were they signed and dated? Yes No N/A4. Packing Material: Inserts Baggies Bubble Wrap Gel Packs Wet Ice Sleeves Other5. Foreign or Regulated Soil? Yes No Location of Sampling:

Cooler Tracking Number	COC ID	Date Opened	Time Opened	Opened By	Temp. °C	Temp Blank?
1686 1901 5724		3/17/21	1010	JM	18.6	<input type="checkbox"/>
1680 1901 5730		3/17/21	1010	JM	1.6	<input type="checkbox"/>
						<input type="checkbox"/>
						<input type="checkbox"/>

6. Were custody papers properly filled out (ink, signed, dated, etc)? Yes No7. Did all bottles arrive in good condition (not broken, no signs of leakage)? Yes No8. Were all sample labels complete (i.e., sample ID, analysis, preservation, etc)? Yes No9. Were appropriate bottles/containers and volumes received for the requested tests? Yes No10. Did sample labels and tags agree with custody documents? Yes No

Notes, Discrepancies, & Resolutions:

Service request Label:



10450 Stancliff Rd., Suite 210
Houston, TX 77099
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SAMPLE ACCEPTANCE POLICY

This policy outlines the criteria samples must meet to be accepted by ALS Environmental - Houston HRMS.

Cooler Custody Seals (desirable, mandatory if specified in SAP):

- ✓ Intact on outside of cooler, signed and dated

Chain-of-Custody (COC) documentation (mandatory):

The following is required on each COC:

- ✓ Sample ID, the location, date and time of collection, collector's name, preservation type, sample type, and any other special remarks concerning the sample. The COC must be completed in ink.
- ✓ Signature and date of relinquishing party.

In the absence of a COC at sample receipt, the COC will be requested from the client.

Sample Integrity (mandatory):

Samples are inspected upon arrival to ensure that sample integrity was not compromised during transfer to the laboratory.

- ✓ Sample containers must arrive in good condition (not broken or leaking).
- ✓ Samples must be labeled appropriately, including Sample IDs, and requested test using durable labels and indelible ink.
- ✓ The correct type of sample bottle must be used for the method requested.
- ✓ An appropriate sample volume, or weight, must be received.
- ✓ Sample IDs and number of containers must reconcile with the COC.
- ✓ Samples must be received within the method defined holding time.

Temperature Requirement (varies by sample matrix):

- ✓ Aqueous and Non-aqueous samples must be shipped and stored cold, at 0 to 6°C.
- ✓ Tissue samples must be shipped and stored frozen, at -20 to -10°C.
- ✓ Air samples are shipped and stored cold, at 0 to 6°C
- ✓ The sample temperature must be recorded on the COC

All cooler inspections are documented on the Cooler Receipt Form (CRF). A separate CRF is completed for each service request. Any samples not meeting the above criteria are noted on the CRF and the Project Manager notified. The Project Manager must resolve any sample integrity issues with the client prior to proceeding with the analysis. Such resolutions are documented in writing and filed with the project folder. Data associated with samples received outside of this acceptance policy will be qualified on the case narrative of the final report.

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Preparation Information Benchsheets

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Phone (713)266-1599 Fax (713)266-0130
www.alsglobal.com

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Preparation Information Benchsheet

Prep Run#: 375919

Team: Semivoa GCMS/TWOODS

Prep WorkFlow: OrgExtDioxA(30)

Prep Method: Method

Status: Prepped

Prep Date/Time: 3/17/21 13:59

#	Lab Code	Client ID	B#	Method /Test	pH	Cl	Matrix	Amt. Ext.	Sample Description
1	E2100264-001	903-42-003 R1	.01	23/PCDD PCDF			Air	0.5000Sample	426 84 004
2	E2100264-002	903-42-001 R2	.01	23/PCDD PCDF			Air	0.5000Sample	426 84 003
3	E2100264-003	903-42-002 R3	.01	23/PCDD PCDF			Air	0.5000Sample	426 84 002
4	E2100264-004	903-42-004 Blank	.01	23/PCDD PCDF			Air	0.5000Sample	426 84 004
5	EQ2100133-01	MB		23/PCDD PCDF			Air	0.5000Sample	
6	EQ2100133-02	LCS		23/PCDD PCDF			Air	0.5000Sample	
7	EQ2100133-03	DLCS		23/PCDD PCDF			Air	0.5000Sample	

Spiking Solutions

Name:	1613B Matrix Working Standard	Inventory ID	215438	Logbook Ref:	215438 JG 2/9/21	Expires On:	08/08/2021
-------	-------------------------------	--------------	--------	--------------	------------------	-------------	------------

EQ2100133-02 200.00µL EQ2100133-03 200.00µL

Name:	23/TO-9A Alternate Working Solution	Inventory ID	215668	Logbook Ref:	tw 02/26/21 100ng/ml	Expires On:	08/25/2021
-------	-------------------------------------	--------------	--------	--------------	----------------------	-------------	------------

E2100264-001 20.00µL E2100264-002 20.00µL E2100264-003 20.00µL E2100264-004 20.00µL EQ2100133-01 20.00µL EQ2100133-02 20.00µL

Name:	23/TO-9A Surrogate Working Solution	Inventory ID	215669	Logbook Ref:	215669 tw 02/26/21 100-200ng/m	Expires On:	08/25/2021
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E2100264-001 40.00µL E2100264-002 40.00µL E2100264-003 40.00µL E2100264-004 40.00µL EQ2100133-01 40.00µL EQ2100133-02 20.00µL

Name:	23/TO-9A Internal Working Solution	Inventory ID	215670	Logbook Ref:	tw 215670 2/26/21	Expires On:	08/25/2021
-------	------------------------------------	--------------	--------	--------------	-------------------	-------------	------------

E2100264-001 40.00µL E2100264-002 40.00µL E2100264-003 40.00µL E2100264-004 40.00µL EQ2100133-01 40.00µL EQ2100133-02 20.00µL

Preparation Steps

Step:	Extraction	Step:	Acid Clean	Step:	Silica Gel Clean	Step:	Final Volume
Started:	3/17/21 13:59	Started:	3/18/21 11:00	Started:	3/19/21 10:00	Started:	3/19/21 13:00
Finished:	3/18/21 09:00	Finished:	3/18/21 12:00	Finished:	3/19/21 13:00	Finished:	3/19/21 16:00
By:	TWOODS	By:	TWOODS	By:	TWOODS	By:	TWOODS
Comments		Comments		Comments		Comments	

Comments:

TIM220419

Printed 3/24/21 by 2021 Tucson Iron and Metal Contraband Incinerator Dioxin and Furan Compliance Test Preparation Information Benchsheet

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Preparation Information Benchsheet

Prep Run#: 375919

Team: Semivoa GCMS/TWOODS

Prep WorkFlow: OrgExtDioxA(30)

Prep Method: Method

Status: Prepped

Prep Date/Time: 3/17/21 13:59

Reviewed By: TW Date: 3/19/21

Chain of Custody

Relinquished By:

Date:

Extracts Examined

Received By:

Date:

Yes No

TM220419

Printed 3/24/21 by b209 Tucson Iron and Metal Contraband Incinerator Dioxin and Furan Compliance Request Preparation Information Benchsheet

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Analytical Results

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Phone (713)266-1599 Fax (713)266-0130
www.alsglobal.com

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client: Bison Engineering, Incorporated **Service Request:** E2100264
Project: Tucson Iron & Metals/TIM220419 **Date Collected:** 03/16/21 11:00
Sample Matrix: Air **Date Received:** 03/17/21 10:10

Sample Name: 903-42-003 R1 **Units:** pg
Lab Code: E2100264-001 **Basis:** NA

Polychlorinated Dibenz-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23 **Date Analyzed:** 03/21/21 04:24
Prep Method: Method **Date Extracted:** 3/17/21
Sample Amount: 0.5000Sample **Instrument Name:** E-HRMS-08
Data File Name: P625474 **GC Column:** DB-5MSUI
ICAL Date: 12/04/20 **Blank File Name:** P625473
Cal Ver. File Name: P625470

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	13.7K		9.50	10.0	0.38	1.001	1
1,2,3,7,8-PeCDD	64.8		6.09	50.0	1.33	1.001	1
1,2,3,4,7,8-HxCDD	33.9BJK		3.62	50.0	1.91	0.998	1
1,2,3,6,7,8-HxCDD	69.0		3.04	50.0	1.08	1.000	1
1,2,3,7,8,9-HxCDD	50.7		3.15	50.0	1.41	1.007	1
1,2,3,4,6,7,8-HpCDD	888		12.1	50.0	0.96	1.000	1
OCDD	7190		9.21	100	0.88	1.000	1
2,3,7,8-TCDF	31.8		10.8	10.8	0.78	1.001	1
1,2,3,7,8-PeCDF	187		17.4	50.0	1.51	1.001	1
2,3,4,7,8-PeCDF	316		17.7	50.0	1.59	1.034	1
1,2,3,4,7,8-HxCDF	299		14.9	50.0	1.30	0.997	1
1,2,3,6,7,8-HxCDF	454P		12.4	50.0	1.09	1.000	1
1,2,3,7,8,9-HxCDF	56.1K		17.2	50.0	1.59	1.040	1
2,3,4,6,7,8-HxCDF	223		14.5	50.0	1.30	1.016	1
1,2,3,4,6,7,8-HpCDF	2300P		10.9	50.0	1.02	1.000	1
1,2,3,4,7,8,9-HpCDF	77.7K		13.6	50.0	1.43	1.036	1
OCDF	4600		15.4	100	0.85	1.005	1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client: Bison Engineering, Incorporated **Service Request:** E2100264
Project: Tucson Iron & Metals/TIM220419 **Date Collected:** 03/16/21 11:00
Sample Matrix: Air **Date Received:** 03/17/21 10:10

Sample Name: 903-42-003 R1 **Units:** pg
Lab Code: E2100264-001 **Basis:** NA

Polychlorinated Dibenz-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23 **Date Analyzed:** 03/21/21 04:24
Prep Method: Method **Date Extracted:** 3/17/21
Sample Amount: 0.5000Sample **Instrument Name:** E-HRMS-08
Data File Name: P625474 **GC Column:** DB-5MSUI
ICAL Date: 12/04/20 **Blank File Name:** P625473
Cal Ver. File Name: P625470

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
Total Tetra-Dioxins	2420		9.50	10.0	0.75		1
Total Penta-Dioxins	1130		6.09	50.0	1.51		1
Total Hexa-Dioxins	625		3.25	50.0	1.21		1
Total Hepta-Dioxins	1580		12.1	50.0	1.04		1
Total Tetra-Furans	2760		10.8	10.8	0.71		1
Total Penta-Furans	4780		17.6	50.0			1
Total Hexa-Furans	2600		14.6	50.0	1.17		1
Total Hepta-Furans	4320		12.1	50.0	1.02		1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client: Bison Engineering, Incorporated
Project: Tucson Iron & Metals/TIM220419
Sample Matrix: Air
Sample Name: 903-42-003 R1
Lab Code: E2100264-001

Service Request: E2100264
Date Collected: 03/16/21 11:00
Date Received: 03/17/21 10:10

Units: Percent
Basis: NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23
Prep Method: Method
Sample Amount: 0.5000 Sample
Data File Name: P625474
ICAL Date: 12/04/20

Date Analyzed: 03/21/21 04:24
Date Extracted: 3/17/21
Instrument Name: E-HRMS-08
GC Column: DB-5MSUI
Blank File Name: P625473
Cal Ver. File Name: P625470

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	920.835	46		40-130	0.77	1.029
13C-1,2,3,7,8-PeCDD	2000	1049.543	52		40-130	1.62	1.241
13C-1,2,3,6,7,8-HxCDD	2000	1103.056	55		40-130	1.31	0.993
13C-1,2,3,4,6,7,8-HpCDD	2000	1023.379	51		25-130	1.05	1.070
13C-OCDD	4000	1246.741	31		25-130	0.92	1.139
13C-2,3,7,8-TCDF	2000	974.324	49		40-130	0.76	0.989
13C-1,2,3,7,8-PeCDF	2000	1065.430	53		40-130	1.53	1.188
13C-1,2,3,6,7,8-HxCDF	2000	989.022	49		40-130	0.53	0.971
13C-1,2,3,4,6,7,8-HpCDF	2000	879.235	44		25-130	0.43	1.045
37Cl-2,3,7,8-TCDD	2000	1909.791	95		70-130	NA	1.001
13C-1,2,3,4,7,8-HxCDD	2000	1865.421	93		70-130	1.26	0.998
13C-2,3,4,7,8-PeCDF	2000	1740.923	87		70-130	1.55	1.034
13C-1,2,3,4,7,8-HxCDF	2000	1963.403	98		70-130	0.51	0.997
13C-1,2,3,4,7,8,9-HpCDF	2000	1798.763	90		70-130	0.44	1.036
13C-1,2,3,7,8,9-HxCDF	2000	1045.557	52		40-130	0.51	1.008

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client: Bison Engineering, Incorporated
Project: Tucson Iron & Metals/TIM220419
Sample Matrix: Air
Sample Name: 903-42-003 R1
Lab Code: E2100264-001

Service Request: E2100264
Date Collected: 03/16/21 11:00
Date Received: 03/17/21 10:10

Units: pg
Basis: NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources**Analysis Method:** 23**Prep Method:** Method**Toxicity Equivalency Quotient**

Analyte Name	Result	DL	MRL	Dilution Factor	TEF	TEF - Adjusted Concentration
2,3,7,8-TCDD	13.7	9.50	10.0	1	1	13.7
1,2,3,7,8-PeCDD	64.8	6.09	50.0	1	1	64.8
1,2,3,4,7,8-HxCDD	33.9	3.62	50.0	1	0.1	3.39
1,2,3,6,7,8-HxCDD	69.0	3.04	50.0	1	0.1	6.90
1,2,3,7,8,9-HxCDD	50.7	3.15	50.0	1	0.1	5.07
1,2,3,4,6,7,8-HpCDD	888	12.1	50.0	1	0.01	8.88
OCDD	7190	9.21	100	1	0.0003	2.16
2,3,7,8-TCDF	31.8	10.8	10.8	1	0.1	3.18
1,2,3,7,8-PeCDF	187	17.4	50.0	1	0.03	5.61
2,3,4,7,8-PeCDF	316	17.7	50.0	1	0.3	94.8
1,2,3,4,7,8-HxCDF	299	14.9	50.0	1	0.1	29.9
1,2,3,6,7,8-HxCDF	454	12.4	50.0	1	0.1	45.4
1,2,3,7,8,9-HxCDF	56.1	17.2	50.0	1	0.1	5.61
2,3,4,6,7,8-HxCDF	223	14.5	50.0	1	0.1	22.3
1,2,3,4,6,7,8-HpCDF	2300	10.9	50.0	1	0.01	23.0
1,2,3,4,7,8,9-HpCDF	77.7	13.6	50.0	1	0.01	0.777
OCDF	4600	15.4	100	1	0.0003	1.38
	Total TEQ					337

2005 WHO TEFs, ND = 0

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client: Bison Engineering, Incorporated
Project: Tucson Iron & Metals/TIM220419
Sample Matrix: Air
Sample Name: 903-42-001 R2
Lab Code: E2100264-002

Service Request: E2100264
Date Collected: 03/16/21 12:45
Date Received: 03/17/21 10:10
Units: pg
Basis: NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23
Prep Method: Method
Sample Amount: 0.5000 Sample
Data File Name: P625475
ICAL Date: 12/04/20

Date Analyzed: 03/21/21 05:14
Date Extracted: 3/17/21
Instrument Name: E-HRMS-08
GC Column: DB-5MSUI
Blank File Name: P625473
Cal Ver. File Name: P625470

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	ND	U	13.6	13.6			1
1,2,3,7,8-PeCDD	47.2JK		5.33	50.0	1.09	1.001	1
1,2,3,4,7,8-HxCDD	27.9BJ		5.89	50.0	1.28	0.998	1
1,2,3,6,7,8-HxCDD	24.6JK		4.94	50.0	1.46	1.001	1
1,2,3,7,8,9-HxCDD	16.7JK		5.12	50.0	1.60	1.008	1
1,2,3,4,6,7,8-HpCDD	80.3B		10.6	50.0	1.17	1.000	1
OCDD	352B		38.9	100	0.92	1.000	1
2,3,7,8-TCDF	ND	U	10.8	10.8			1
1,2,3,7,8-PeCDF	175		16.3	50.0	1.54	1.001	1
2,3,4,7,8-PeCDF	315		16.6	50.0	1.63	1.035	1
1,2,3,4,7,8-HxCDF	252		10.9	50.0	1.22	0.997	1
1,2,3,6,7,8-HxCDF	222		9.01	50.0	1.06	1.000	1
1,2,3,7,8,9-HxCDF	43.2J		12.6	50.0	1.23	1.039	1
2,3,4,6,7,8-HxCDF	145		10.6	50.0	1.19	1.016	1
1,2,3,4,6,7,8-HpCDF	433P		14.1	50.0	1.02	1.000	1
1,2,3,4,7,8,9-HpCDF	49.0JK		17.6	50.0	1.36	1.036	1
OCDF	147K		63.1	100	0.63	1.004	1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client: Bison Engineering, Incorporated **Service Request:** E2100264
Project: Tucson Iron & Metals/TIM220419 **Date Collected:** 03/16/21 12:45
Sample Matrix: Air **Date Received:** 03/17/21 10:10

Sample Name: 903-42-001 R2 **Units:** pg
Lab Code: E2100264-002 **Basis:** NA

Polychlorinated Dibenz-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23 **Date Analyzed:** 03/21/21 05:14
Prep Method: Method **Date Extracted:** 3/17/21
Sample Amount: 0.5000Sample **Instrument Name:** E-HRMS-08
Data File Name: P625475 **GC Column:** DB-5MSUI
ICAL Date: 12/04/20 **Blank File Name:** P625473
Cal Ver. File Name: P625470

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
Total Tetra-Dioxins	2160		13.6	13.6	0.76		1
Total Penta-Dioxins	915		5.33	50.0	1.52		1
Total Hexa-Dioxins	332		5.29	50.0	1.15		1
Total Hepta-Dioxins	80.3		10.6	50.0	1.17		1
Total Tetra-Furans	2850		10.8	10.8	0.72		1
Total Penta-Furans	5050		16.4	50.0			1
Total Hexa-Furans	2200		10.6	50.0	1.14		1
Total Hepta-Furans	567		15.7	50.0	1.02		1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client: Bison Engineering, Incorporated
Project: Tucson Iron & Metals/TIM220419
Sample Matrix: Air
Sample Name: 903-42-001 R2
Lab Code: E2100264-002

Service Request: E2100264
Date Collected: 03/16/21 12:45
Date Received: 03/17/21 10:10

Units: Percent
Basis: NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23
Prep Method: Method
Sample Amount: 0.5000 Sample

Date Analyzed: 03/21/21 05:14
Date Extracted: 3/17/21
Instrument Name: E-HRMS-08
GC Column: DB-5MSUI

Data File Name: P625475
ICAL Date: 12/04/20

Blank File Name: P625473
Cal Ver. File Name: P625470

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	747.071	37	Y	40-130	0.79	1.029
13C-1,2,3,7,8-PeCDD	2000	816.691	41		40-130	1.53	1.241
13C-1,2,3,6,7,8-HxCDD	2000	870.184	44		40-130	1.20	0.993
13C-1,2,3,4,6,7,8-HpCDD	2000	512.751	26		25-130	1.02	1.071
13C-OCDD	4000	364.631	9	Y	25-130	0.90	1.140
13C-2,3,7,8-TCDF	2000	831.566	42		40-130	0.75	0.988
13C-1,2,3,7,8-PeCDF	2000	823.741	41		40-130	1.54	1.188
13C-1,2,3,6,7,8-HxCDF	2000	760.176	38	Y	40-130	0.50	0.971
13C-1,2,3,4,6,7,8-HpCDF	2000	429.688	21	Y	25-130	0.44	1.045
37Cl-2,3,7,8-TCDD	2000	2211.117	111		70-130	NA	1.001
13C-1,2,3,4,7,8-HxCDD	2000	2176.382	109		70-130	1.36	0.998
13C-2,3,4,7,8-PeCDF	2000	2013.211	101		70-130	1.55	1.034
13C-1,2,3,4,7,8-HxCDF	2000	2406.456	120		70-130	0.51	0.997
13C-1,2,3,4,7,8,9-HpCDF	2000	2333.916	117		70-130	0.41	1.036
13C-1,2,3,7,8,9-HxCDF	2000	732.919	37	Y	40-130	0.52	1.008

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client: Bison Engineering, Incorporated
Project: Tucson Iron & Metals/TIM220419
Sample Matrix: Air
Sample Name: 903-42-001 R2
Lab Code: E2100264-002

Service Request: E2100264
Date Collected: 03/16/21 12:45
Date Received: 03/17/21 10:10

Units: pg
Basis: NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23
Prep Method: Method

Toxicity Equivalency Quotient

Analyte Name	Result	DL	MRL	Dilution Factor	TEF	TEF - Adjusted Concentration
2,3,7,8-TCDD	ND	13.6	13.6	1	1	
1,2,3,7,8-PeCDD	47.2	5.33	50.0	1	1	47.2
1,2,3,4,7,8-HxCDD	27.9	5.89	50.0	1	0.1	2.79
1,2,3,6,7,8-HxCDD	24.6	4.94	50.0	1	0.1	2.46
1,2,3,7,8,9-HxCDD	16.7	5.12	50.0	1	0.1	1.67
1,2,3,4,6,7,8-HpCDD	80.3	10.6	50.0	1	0.01	0.803
OCDD	352	38.9	100	1	0.0003	0.106
2,3,7,8-TCDF	ND	10.8	10.8	1	0.1	
1,2,3,7,8-PeCDF	175	16.3	50.0	1	0.03	5.25
2,3,4,7,8-PeCDF	315	16.6	50.0	1	0.3	94.5
1,2,3,4,7,8-HxCDF	252	10.9	50.0	1	0.1	25.2
1,2,3,6,7,8-HxCDF	222	9.01	50.0	1	0.1	22.2
1,2,3,7,8,9-HxCDF	43.2	12.6	50.0	1	0.1	4.32
2,3,4,6,7,8-HxCDF	145	10.6	50.0	1	0.1	14.5
1,2,3,4,6,7,8-HpCDF	433	14.1	50.0	1	0.01	4.33
1,2,3,4,7,8,9-HpCDF	49.0	17.6	50.0	1	0.01	0.490
OCDF	147	63.1	100	1	0.0003	0.0441
Total TEQ						226

2005 WHO TEFs, ND = 0

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client: Bison Engineering, Incorporated
Project: Tucson Iron & Metals/TIM220419
Sample Matrix: Air
Sample Name: 903-42-002 R3
Lab Code: E2100264-003

Service Request: E2100264
Date Collected: 03/16/21 14:00
Date Received: 03/17/21 10:10
Units: pg
Basis: NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23
Prep Method: Method
Sample Amount: 0.5000 Sample
Data File Name: P625476
ICAL Date: 12/04/20

Date Analyzed: 03/21/21 06:04
Date Extracted: 3/17/21
Instrument Name: E-HRMS-08
GC Column: DB-5MSUI
Blank File Name: P625473
Cal Ver. File Name: P625470

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	37.6K		16.1	16.1	0.90	1.000	1
1,2,3,7,8-PeCDD	75.1K		6.01	50.0	1.21	1.001	1
1,2,3,4,7,8-HxCDD	37.3BJK		8.03	50.0	1.89	0.998	1
1,2,3,6,7,8-HxCDD	56.0		6.73	50.0	1.06	1.000	1
1,2,3,7,8,9-HxCDD	41.9J		6.98	50.0	1.23	1.007	1
1,2,3,4,6,7,8-HpCDD	790		9.71	50.0	1.05	1.000	1
OCDD	9270		14.0	100	0.88	1.000	1
2,3,7,8-TCDF	129		15.0	15.0	0.84	1.001	1
1,2,3,7,8-PeCDF	259		43.2	50.0	1.69	1.001	1
2,3,4,7,8-PeCDF	437		44.0	50.0	1.40	1.035	1
1,2,3,4,7,8-HxCDF	353		13.0	50.0	1.22	0.997	1
1,2,3,6,7,8-HxCDF	361P		10.8	50.0	1.35	1.000	1
1,2,3,7,8,9-HxCDF	84.2		15.0	50.0	1.13	1.039	1
2,3,4,6,7,8-HxCDF	239K		12.7	50.0	0.98	1.016	1
1,2,3,4,6,7,8-HpCDF	1140P		15.2	50.0	1.04	1.000	1
1,2,3,4,7,8,9-HpCDF	90.3K		19.1	50.0	0.81	1.036	1
OCDF	1000		24.1	100	0.78	1.004	1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client: Bison Engineering, Incorporated
Project: Tucson Iron & Metals/TIM220419
Sample Matrix: Air
Sample Name: 903-42-002 R3
Lab Code: E2100264-003

Service Request: E2100264
Date Collected: 03/16/21 14:00
Date Received: 03/17/21 10:10
Units: pg
Basis: NA

Polychlorinated Dibenz-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23
Prep Method: Method
Sample Amount: 0.5000 Sample
Data File Name: P625476
ICAL Date: 12/04/20

Date Analyzed: 03/21/21 06:04
Date Extracted: 3/17/21
Instrument Name: E-HRMS-08
GC Column: DB-5MSUI
Blank File Name: P625473
Cal Ver. File Name: P625470

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
Total Tetra-Dioxins	3470		16.1	16.1	0.80		1
Total Penta-Dioxins	1400		6.01	50.0	1.39		1
Total Hexa-Dioxins	675		7.20	50.0	1.41		1
Total Hepta-Dioxins	1240		9.71	50.0	1.06		1
Total Tetra-Furans	9120		15.0	15.0	0.72		1
Total Penta-Furans	5190		43.6	50.0			1
Total Hexa-Furans	3180		12.7	50.0	1.22		1
Total Hepta-Furans	1920		17.0	50.0	1.04		1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client: Bison Engineering, Incorporated
Project: Tucson Iron & Metals/TIM220419
Sample Matrix: Air
Sample Name: 903-42-002 R3
Lab Code: E2100264-003

Service Request: E2100264
Date Collected: 03/16/21 14:00
Date Received: 03/17/21 10:10

Units: Percent
Basis: NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23
Prep Method: Method
Sample Amount: 0.5000 Sample

Date Analyzed: 03/21/21 06:04
Date Extracted: 3/17/21
Instrument Name: E-HRMS-08
GC Column: DB-5MSUI

Data File Name: P625476
ICAL Date: 12/04/20

Blank File Name: P625473
Cal Ver. File Name: P625470

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	457.573	23	Y	40-130	0.78	1.030
13C-1,2,3,7,8-PeCDD	2000	548.740	27	Y	40-130	1.57	1.242
13C-1,2,3,6,7,8-HxCDD	2000	557.679	28	Y	40-130	1.22	0.993
13C-1,2,3,4,6,7,8-HpCDD	2000	484.941	24	Y	25-130	1.04	1.071
13C-OCDD	4000	559.474	14	Y	25-130	0.86	1.140
13C-2,3,7,8-TCDF	2000	494.196	25	Y	40-130	0.73	0.989
13C-1,2,3,7,8-PeCDF	2000	550.396	28	Y	40-130	1.54	1.189
13C-1,2,3,6,7,8-HxCDF	2000	507.366	25	Y	40-130	0.50	0.972
13C-1,2,3,4,6,7,8-HpCDF	2000	394.393	20	Y	25-130	0.41	1.045
37Cl-2,3,7,8-TCDD	2000	3160.258	158	Y	70-130	NA	1.001
13C-1,2,3,4,7,8-HxCDD	2000	2992.712	150	Y	70-130	1.37	0.997
13C-2,3,4,7,8-PeCDF	2000	2890.376	145	Y	70-130	1.56	1.034
13C-1,2,3,4,7,8-HxCDF	2000	3289.943	164	Y	70-130	0.52	0.996
13C-1,2,3,4,7,8,9-HpCDF	2000	3331.743	167	Y	70-130	0.43	1.036
13C-1,2,3,7,8,9-HxCDF	2000	921.022	46		40-130	0.52	1.008

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client: Bison Engineering, Incorporated
Project: Tucson Iron & Metals/TIM220419
Sample Matrix: Air
Sample Name: 903-42-002 R3
Lab Code: E2100264-003

Service Request: E2100264
Date Collected: 03/16/21 14:00
Date Received: 03/17/21 10:10

Units: pg
Basis: NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23
Prep Method: Method

Toxicity Equivalency Quotient

Analyte Name	Result	DL	MRL	Dilution Factor	TEF	TEF - Adjusted Concentration
2,3,7,8-TCDD	37.6	16.1	16.1	1	1	37.6
1,2,3,7,8-PeCDD	75.1	6.01	50.0	1	1	75.1
1,2,3,4,7,8-HxCDD	37.3	8.03	50.0	1	0.1	3.73
1,2,3,6,7,8-HxCDD	56.0	6.73	50.0	1	0.1	5.60
1,2,3,7,8,9-HxCDD	41.9	6.98	50.0	1	0.1	4.19
1,2,3,4,6,7,8-HpCDD	790	9.71	50.0	1	0.01	7.90
OCDD	9270	14.0	100	1	0.0003	2.78
2,3,7,8-TCDF	129	15.0	15.0	1	0.1	12.9
1,2,3,7,8-PeCDF	259	43.2	50.0	1	0.03	7.77
2,3,4,7,8-PeCDF	437	44.0	50.0	1	0.3	131
1,2,3,4,7,8-HxCDF	353	13.0	50.0	1	0.1	35.3
1,2,3,6,7,8-HxCDF	361	10.8	50.0	1	0.1	36.1
1,2,3,7,8,9-HxCDF	84.2	15.0	50.0	1	0.1	8.42
2,3,4,6,7,8-HxCDF	239	12.7	50.0	1	0.1	23.9
1,2,3,4,6,7,8-HpCDF	1140	15.2	50.0	1	0.01	11.4
1,2,3,4,7,8,9-HpCDF	90.3	19.1	50.0	1	0.01	0.903
OCDF	1000	24.1	100	1	0.0003	0.300
	Total TEQ					405

2005 WHO TEFs, ND = 0

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client: Bison Engineering, Incorporated
Project: Tucson Iron & Metals/TIM220419
Sample Matrix: Air
Sample Name: 903-42-004 Blank
Lab Code: E2100264-004

Service Request: E2100264
Date Collected: 03/16/21 11:00
Date Received: 03/17/21 10:10
Units: pg
Basis: NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23
Prep Method: Method
Sample Amount: 0.5000 Sample
Data File Name: P625477
ICAL Date: 12/04/20

Date Analyzed: 03/21/21 06:54
Date Extracted: 3/17/21
Instrument Name: E-HRMS-08
GC Column: DB-5MSUI
Blank File Name: P625473
Cal Ver. File Name: P625470

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	ND	U	9.58	10.0			1
1,2,3,7,8-PeCDD	ND	U	2.98	50.0			1
1,2,3,4,7,8-HxCDD	5.65BJK		4.34	50.0	2.20	0.998	1
1,2,3,6,7,8-HxCDD	ND	U	3.64	50.0			1
1,2,3,7,8,9-HxCDD	ND	U	3.77	50.0			1
1,2,3,4,6,7,8-HpCDD	13.0BJK		5.49	50.0	1.76	1.000	1
OCDD	146B		16.3	100	0.78	1.000	1
2,3,7,8-TCDF	ND	U	5.62	10.0			1
1,2,3,7,8-PeCDF	ND	U	7.32	50.0			1
2,3,4,7,8-PeCDF	ND	U	7.46	50.0			1
1,2,3,4,7,8-HxCDF	5.53JK		4.72	50.0	0.63	0.997	1
1,2,3,6,7,8-HxCDF	ND	U	3.93	50.0			1
1,2,3,7,8,9-HxCDF	ND	U	5.46	50.0			1
2,3,4,6,7,8-HxCDF	6.34JK		4.60	50.0	2.03	1.016	1
1,2,3,4,6,7,8-HpCDF	25.6J		6.14	50.0	1.14	1.000	1
1,2,3,4,7,8,9-HpCDF	ND	U	7.69	50.0			1
OCDF	44.5J		26.8	100	0.81	1.005	1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client: Bison Engineering, Incorporated
Project: Tucson Iron & Metals/TIM220419
Sample Matrix: Air
Sample Name: 903-42-004 Blank
Lab Code: E2100264-004

Service Request: E2100264
Date Collected: 03/16/21 11:00
Date Received: 03/17/21 10:10
Units: pg
Basis: NA

Polychlorinated Dibenz-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23
Prep Method: Method
Sample Amount: 0.5000 Sample
Data File Name: P625477
ICAL Date: 12/04/20

Date Analyzed: 03/21/21 06:54
Date Extracted: 3/17/21
Instrument Name: E-HRMS-08
GC Column: DB-5MSUI
Blank File Name: P625473
Cal Ver. File Name: P625470

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
Total Tetra-Dioxins	ND	U	9.58	10.0			1
Total Penta-Dioxins	ND	U	2.98	50.0			1
Total Hexa-Dioxins	ND	U	3.89	50.0			1
Total Hepta-Dioxins	ND	U	5.49	50.0			1
Total Tetra-Furans	ND	U	5.62	10.0			1
Total Penta-Furans	ND	U	7.39	50.0			1
Total Hexa-Furans	ND	U	4.62	50.0			1
Total Hepta-Furans	25.6J		6.83	50.0	1.14		1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client: Bison Engineering, Incorporated
Project: Tucson Iron & Metals/TIM220419
Sample Matrix: Air
Sample Name: 903-42-004 Blank
Lab Code: E2100264-004
Service Request: E2100264
Date Collected: 03/16/21 11:00
Date Received: 03/17/21 10:10
Units: Percent
Basis: NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23
Prep Method: Method
Sample Amount: 0.5000 Sample
Date Analyzed: 03/21/21 06:54
Date Extracted: 3/17/21
Instrument Name: E-HRMS-08
GC Column: DB-5MSUI
Data File Name: P625477
ICAL Date: 12/04/20
Blank File Name: P625473
Cal Ver. File Name: P625470

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	970.660	49		40-130	0.78	1.029
13C-1,2,3,7,8-PeCDD	2000	1020.955	51		40-130	1.59	1.241
13C-1,2,3,6,7,8-HxCDD	2000	936.216	47		40-130	1.29	0.993
13C-1,2,3,4,6,7,8-HpCDD	2000	697.519	35		25-130	1.04	1.071
13C-OCDD	4000	609.680	15	Y	25-130	0.90	1.140
13C-2,3,7,8-TCDF	2000	997.551	50		40-130	0.76	0.988
13C-1,2,3,7,8-PeCDF	2000	997.755	50		40-130	1.59	1.189
13C-1,2,3,6,7,8-HxCDF	2000	854.094	43		40-130	0.52	0.971
13C-1,2,3,4,6,7,8-HpCDF	2000	647.253	32		25-130	0.43	1.045
37Cl-2,3,7,8-TCDD	2000	1970.397	99		70-130	NA	1.001
13C-1,2,3,4,7,8-HxCDD	2000	1791.958	90		70-130	1.26	0.997
13C-2,3,4,7,8-PeCDF	2000	1714.187	86		70-130	1.56	1.034
13C-1,2,3,4,7,8-HxCDF	2000	2065.845	103		70-130	0.51	0.997
13C-1,2,3,4,7,8,9-HpCDF	2000	1759.011	88		70-130	0.41	1.036
13C-1,2,3,7,8,9-HxCDF	2000	686.407	34	Y	40-130	0.48	1.008

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client: Bison Engineering, Incorporated
Project: Tucson Iron & Metals/TIM220419
Sample Matrix: Air
Sample Name: 903-42-004 Blank
Lab Code: E2100264-004

Service Request: E2100264
Date Collected: 03/16/21 11:00
Date Received: 03/17/21 10:10

Units: pg
Basis: NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources**Analysis Method:** 23**Prep Method:** Method**Toxicity Equivalency Quotient**

Analyte Name	Result	DL	MRL	Dilution Factor	TEF	TEF - Adjusted Concentration
2,3,7,8-TCDD	ND	9.58	10.0	1	1	
1,2,3,7,8-PeCDD	ND	2.98	50.0	1	1	
1,2,3,4,7,8-HxCDD	5.65	4.34	50.0	1	0.1	0.565
1,2,3,6,7,8-HxCDD	ND	3.64	50.0	1	0.1	
1,2,3,7,8,9-HxCDD	ND	3.77	50.0	1	0.1	
1,2,3,4,6,7,8-HpCDD	13.0	5.49	50.0	1	0.01	0.130
OCDD	146	16.3	100	1	0.0003	0.0438
2,3,7,8-TCDF	ND	5.62	10.0	1	0.1	
1,2,3,7,8-PeCDF	ND	7.32	50.0	1	0.03	
2,3,4,7,8-PeCDF	ND	7.46	50.0	1	0.3	
1,2,3,4,7,8-HxCDF	5.53	4.72	50.0	1	0.1	0.553
1,2,3,6,7,8-HxCDF	ND	3.93	50.0	1	0.1	
1,2,3,7,8,9-HxCDF	ND	5.46	50.0	1	0.1	
2,3,4,6,7,8-HxCDF	6.34	4.60	50.0	1	0.1	0.634
1,2,3,4,6,7,8-HpCDF	25.6	6.14	50.0	1	0.01	0.256
1,2,3,4,7,8,9-HpCDF	ND	7.69	50.0	1	0.01	
OCDF	44.5	26.8	100	1	0.0003	0.0134
Total TEQ						2.20

2005 WHO TEFs, ND = 0

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client: Bison Engineering, Incorporated **Service Request:** E2100264
Project: Tucson Iron & Metals/TIM220419 **Date Collected:** NA
Sample Matrix: Air **Date Received:** NA

Sample Name: Method Blank **Units:** pg
Lab Code: EQ2100133-01 **Basis:** NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23 **Date Analyzed:** 03/21/21 03:35
Prep Method: Method **Date Extracted:** 3/17/21
Sample Amount: 0.5000Sample **Instrument Name:** E-HRMS-08
GC Column: DB-5MSUI

Data File Name: P625473 **Blank File Name:** P625473
ICAL Date: 12/04/20 **Cal Ver. File Name:** P625470

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	ND	U	11.7	11.7			1
1,2,3,7,8-PeCDD	ND	U	4.40	50.0			1
1,2,3,4,7,8-HxCDD	6.30J		4.24	50.0	1.29	0.998	1
1,2,3,6,7,8-HxCDD	ND	U	3.56	50.0			1
1,2,3,7,8,9-HxCDD	ND	U	3.69	50.0			1
1,2,3,4,6,7,8-HpCDD	8.14J		4.29	50.0	1.10	1.000	1
OCDD	65.1JK		9.06	100	0.70	1.000	1
2,3,7,8-TCDF	ND	U	9.11	10.0			1
1,2,3,7,8-PeCDF	ND	U	3.63	50.0			1
2,3,4,7,8-PeCDF	ND	U	3.70	50.0			1
1,2,3,4,7,8-HxCDF	ND	U	5.19	50.0			1
1,2,3,6,7,8-HxCDF	ND	U	4.32	50.0			1
1,2,3,7,8,9-HxCDF	ND	U	6.00	50.0			1
2,3,4,6,7,8-HxCDF	ND	U	5.05	50.0			1
1,2,3,4,6,7,8-HpCDF	ND	U	5.40	50.0			1
1,2,3,4,7,8,9-HpCDF	ND	U	6.76	50.0			1
OCDF	ND	U	14.1	100			1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client: Bison Engineering, Incorporated **Service Request:** E2100264
Project: Tucson Iron & Metals/TIM220419 **Date Collected:** NA
Sample Matrix: Air **Date Received:** NA

Sample Name: Method Blank **Units:** pg
Lab Code: EQ2100133-01 **Basis:** NA

Polychlorinated Dibenz-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23 **Date Analyzed:** 03/21/21 03:35
Prep Method: Method **Date Extracted:** 3/17/21
Sample Amount: 0.5000Sample **Instrument Name:** E-HRMS-08
GC Column: DB-5MSUI

Data File Name: P625473 **Blank File Name:** P625473
ICAL Date: 12/04/20 **Cal Ver. File Name:** P625470

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
Total Tetra-Dioxins	ND	U	11.7	11.7			1
Total Penta-Dioxins	ND	U	4.40	50.0			1
Total Hexa-Dioxins	6.30J		3.81	50.0	1.29		1
Total Hepta-Dioxins	8.14J		4.29	50.0	1.10		1
Total Tetra-Furans	ND	U	9.11	10.0			1
Total Penta-Furans	ND	U	3.66	50.0			1
Total Hexa-Furans	ND	U	5.07	50.0			1
Total Hepta-Furans	ND	U	6.00	50.0			1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client: Bison Engineering, Incorporated
Project: Tucson Iron & Metals/TIM220419
Sample Matrix: Air
Sample Name: Method Blank
Lab Code: EQ2100133-01

Service Request: E2100264
Date Collected: NA
Date Received: NA

Units: Percent
Basis: NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23
Prep Method: Method
Sample Amount: 0.5000 Sample

Date Analyzed: 03/21/21 03:35
Date Extracted: 3/17/21
Instrument Name: E-HRMS-08
GC Column: DB-5MSUI

Data File Name: P625473
ICAL Date: 12/04/20

Blank File Name: P625473
Cal Ver. File Name: P625470

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	913.032	46		40-130	0.80	1.029
13C-1,2,3,7,8-PeCDD	2000	1089.804	54		40-130	1.58	1.241
13C-1,2,3,6,7,8-HxCDD	2000	1197.598	60		40-130	1.30	0.993
13C-1,2,3,4,6,7,8-HpCDD	2000	1070.563	54		25-130	1.03	1.071
13C-OCDD	4000	1236.529	31		25-130	0.91	1.140
13C-2,3,7,8-TCDF	2000	1004.384	50		40-130	0.79	0.988
13C-1,2,3,7,8-PeCDF	2000	1102.655	55		40-130	1.56	1.188
13C-1,2,3,6,7,8-HxCDF	2000	1047.395	52		40-130	0.54	0.971
13C-1,2,3,4,6,7,8-HpCDF	2000	887.548	44		25-130	0.43	1.045
37Cl-2,3,7,8-TCDD	2000	2029.557	101		70-130	NA	1.001
13C-1,2,3,4,7,8-HxCDD	2000	1862.079	93		70-130	1.26	0.998
13C-2,3,4,7,8-PeCDF	2000	1941.541	97		70-130	1.56	1.034
13C-1,2,3,4,7,8-HxCDF	2000	2232.480	112		70-130	0.55	0.997
13C-1,2,3,4,7,8,9-HpCDF	2000	1949.166	97		70-130	0.44	1.036
13C-1,2,3,7,8,9-HxCDF	2000	1079.392	54		40-130	0.50	1.008



Accuracy & Precision

ALS Environmental - Houston HRMS
10450 Stancliff Rd., Suite 210, Houston TX 77099
Phone (713)266-1599 Fax (713)266-0130
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dba ALS Environmental

QA/QC Report

Client: Bison Engineering, Incorporated
Project: Tucson Iron & Metals/TIM220419
Sample Matrix: Air

Service Request: E2100264
Date Analyzed: 03/23/21 - 03/21/21
Date Extracted: 03/17/21

Duplicate Lab Control Sample Summary

Polychlorinated Dibenz-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method:	23	Units:	pg
Prep Method:	Method	Basis:	NA
		Analysis Lot:	717286

Lab Control Sample
EQ2100133-02

Duplicate Lab Control Sample
EQ2100133-03

Analyte Name	Result	Spike Amount	% Rec	Result	Spike Amount	% Rec	% Rec Limits	RPD	RPD Limit
1,2,3,4,6,7,8-HpCDD	2870	2000	144 *	2010	2000	100	70-130	35 *	20
1,2,3,4,7,8-HxCDD	2260	2000	113	2240	2000	112	70-130	<1	20
1,2,3,6,7,8-HxCDD	2170	2000	109	1940	2000	97	70-130	11	20
1,2,3,7,8,9-HxCDD	2130	2000	106	2000	2000	100	70-130	6	20
1,2,3,7,8-PeCDD	2160	2000	108	2330	2000	117	70-130	8	20
2,3,7,8-TCDD	387	400	97	427	400	107	70-130	10	20
OCDD	23400	4000	585 *	4320	4000	108	70-130	138 *	20
1,2,3,4,6,7,8-HpCDF	2290	2000	114	2130	2000	107	70-130	7	20
1,2,3,4,7,8,9-HpCDF	2540	2000	127	2230	2000	112	70-130	13	20
1,2,3,4,7,8-HxCDF	2250	2000	113	2400	2000	120	70-130	6	20
1,2,3,6,7,8-HxCDF	2070	2000	104	2090	2000	104	70-130	<1	20
1,2,3,7,8,9-HxCDF	2300	2000	115	2240	2000	112	70-130	3	20
1,2,3,7,8-PeCDF	1910	2000	95	2100	2000	105	70-130	10	20
2,3,4,6,7,8-HxCDF	2190	2000	110	2240	2000	112	70-130	2	20
2,3,4,7,8-PeCDF	2090	2000	105	2260	2000	113	70-130	8	20
2,3,7,8-TCDF	387	400	97	405	400	101	70-130	4	20
OCDF	8110	4000	203 *	4050	4000	101	70-130	67 *	20

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client: Bison Engineering, Incorporated **Service Request:** E2100264
Project: Tucson Iron & Metals/TIM220419 **Date Collected:** NA
Sample Matrix: Air **Date Received:** NA

Sample Name: Lab Control Sample **Units:** pg
Lab Code: EQ2100133-02 **Basis:** NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23 **Date Analyzed:** 03/23/21 07:13
Prep Method: Method **Date Extracted:** 3/17/21
Sample Amount: 0.5000Sample **Instrument Name:** E-HRMS-07
GC Column: DB-5MSUI

Data File Name: P531258 **Blank File Name:** P625473
ICAL Date: 01/18/21 **Cal Ver. File Name:** P531247

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	387	3.82	10.0	0.71	1.001	1	
1,2,3,7,8-PeCDD	2160	1.27	50.0	1.62	1.000	1	
1,2,3,4,7,8-HxCDD	2260	2.66	50.0	1.32	0.998	1	
1,2,3,6,7,8-HxCDD	2170	2.36	50.0	1.23	1.000	1	
1,2,3,7,8,9-HxCDD	2130	2.40	50.0	1.31	1.007	1	
1,2,3,4,6,7,8-HpCDD	2870	20.3	50.0	1.03	1.000	1	
OCDD	23400	106	106	0.88	1.000	1	
2,3,7,8-TCDF	387	2.00	10.0	0.70	1.001	1	
1,2,3,7,8-PeCDF	1910	2.25	50.0	1.58	1.001	1	
2,3,4,7,8-PeCDF	2090	2.39	50.0	1.56	1.027	1	
1,2,3,4,7,8-HxCDF	2250	1.57	50.0	1.25	0.998	1	
1,2,3,6,7,8-HxCDF	2070	1.36	50.0	1.24	1.000	1	
1,2,3,7,8,9-HxCDF	2300	1.84	50.0	1.25	1.034	1	
2,3,4,6,7,8-HxCDF	2190	1.58	50.0	1.22	1.014	1	
1,2,3,4,6,7,8-HpCDF	2290	6.45	50.0	1.05	1.000	1	
1,2,3,4,7,8,9-HpCDF	2540	7.97	50.0	1.04	1.037	1	
OCDF	8110	21.2	100	0.88	1.005	1	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client: Bison Engineering, Incorporated **Service Request:** E2100264
Project: Tucson Iron & Metals/TIM220419 **Date Collected:** NA
Sample Matrix: Air **Date Received:** NA

Sample Name: Lab Control Sample **Units:** pg
Lab Code: EQ2100133-02 **Basis:** NA

Polychlorinated Dibenz-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23 **Date Analyzed:** 03/23/21 07:13
Prep Method: Method **Date Extracted:** 3/17/21
Sample Amount: 0.5000Sample **Instrument Name:** E-HRMS-07
GC Column: DB-5MSUI

Data File Name: P531258 **Blank File Name:** P625473
ICAL Date: 01/18/21 **Cal Ver. File Name:** P531247

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
Total Tetra-Dioxins	387		3.82	10.0	0.71		1
Total Penta-Dioxins	2160		1.27	50.0	1.62		1
Total Hexa-Dioxins	6570		2.46	50.0	1.34		1
Total Hepta-Dioxins	3850		20.3	50.0	1.04		1
Total Tetra-Furans	390		2.00	10.0	0.69		1
Total Penta-Furans	4010		2.32	50.0			1
Total Hexa-Furans	8940		1.57	50.0	1.32		1
Total Hepta-Furans	6480		7.13	50.0	1.05		1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client: Bison Engineering, Incorporated **Service Request:** E2100264
Project: Tucson Iron & Metals/TIM220419 **Date Collected:** NA
Sample Matrix: Air **Date Received:** NA

Sample Name: Lab Control Sample **Units:** Percent
Lab Code: EQ2100133-02 **Basis:** NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23 **Date Analyzed:** 03/23/21 07:13
Prep Method: Method **Date Extracted:** 3/17/21
Sample Amount: 0.5000Sample **Instrument Name:** E-HRMS-07
GC Column: DB-5MSUI

Data File Name: P531258 **Blank File Name:** P625473
ICAL Date: 01/18/21 **Cal Ver. File Name:** P531247

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	1127.583	56		40-130	0.78	1.019
13C-1,2,3,7,8-PeCDD	2000	1443.283	72		40-130	1.58	1.171
13C-1,2,3,6,7,8-HxCDD	2000	1208.110	60		40-130	1.24	0.994
13C-1,2,3,4,6,7,8-HpCDD	2000	1121.525	56		25-130	1.07	1.065
13C-OCDD	4000	1362.608	34		25-130	0.89	1.141
13C-2,3,7,8-TCDF	2000	1097.289	55		40-130	0.77	0.994
13C-1,2,3,7,8-PeCDF	2000	1322.787	66		40-130	1.63	1.131
13C-1,2,3,6,7,8-HxCDF	2000	1075.350	54		40-130	0.52	0.975
13C-1,2,3,4,6,7,8-HpCDF	2000	940.899	47		25-130	0.46	1.041
37Cl-2,3,7,8-TCDD	2000	1981.949	99		70-130	NA	1.001
13C-1,2,3,4,7,8-HxCDD	2000	1812.532	91		70-130	1.23	0.998
13C-2,3,4,7,8-PeCDF	2000	1929.410	96		70-130	1.58	1.027
13C-1,2,3,4,7,8-HxCDF	2000	2152.454	108		70-130	0.51	0.997
13C-1,2,3,4,7,8,9-HpCDF	2000	2137.844	107		70-130	0.45	1.037
13C-1,2,3,7,8,9-HxCDF	2000	1151.544	58		40-130	0.51	1.008

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Analytical Report

Client: Bison Engineering, Incorporated
Project: Tucson Iron & Metals/TIM220419
Sample Matrix: Air
Sample Name: Duplicate Lab Control Sample
Lab Code: EQ2100133-03

Service Request: E2100264
Date Collected: NA
Date Received: NA

Units: pg
Basis: NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23
Prep Method: Method
Sample Amount: 0.5000Sample

Date Analyzed: 03/21/21 08:42
Date Extracted: 3/17/21
Instrument Name: E-HRMS-08
GC Column: DB-5MSUI

Data File Name: P625479
ICAL Date: 12/04/20

Blank File Name: P625473
Cal Ver. File Name: P625470

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	427		10.3	10.3	0.80	1.001	1
1,2,3,7,8-PeCDD	2330		3.77	50.0	1.52	1.001	1
1,2,3,4,7,8-HxCDD	2240		3.28	50.0	1.22	0.998	1
1,2,3,6,7,8-HxCDD	1940		2.75	50.0	1.22	1.000	1
1,2,3,7,8,9-HxCDD	2000		2.85	50.0	1.27	1.008	1
1,2,3,4,6,7,8-HpCDD	2010		5.04	50.0	1.03	1.000	1
OCDD	4320		7.32	100	0.83	1.000	1
2,3,7,8-TCDF	405		5.89	10.0	0.77	1.001	1
1,2,3,7,8-PeCDF	2100		3.42	50.0	1.46	1.001	1
2,3,4,7,8-PeCDF	2260		3.49	50.0	1.54	1.034	1
1,2,3,4,7,8-HxCDF	2400		2.93	50.0	1.20	0.997	1
1,2,3,6,7,8-HxCDF	2090		2.44	50.0	1.20	1.000	1
1,2,3,7,8,9-HxCDF	2240		3.39	50.0	1.28	1.039	1
2,3,4,6,7,8-HxCDF	2240		2.86	50.0	1.17	1.016	1
1,2,3,4,6,7,8-HpCDF	2130		4.67	50.0	0.98	1.000	1
1,2,3,4,7,8,9-HpCDF	2230		5.86	50.0	0.98	1.036	1
OCDF	4050		13.2	100	0.89	1.004	1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client: Bison Engineering, Incorporated **Service Request:** E2100264
Project: Tucson Iron & Metals/TIM220419 **Date Collected:** NA
Sample Matrix: Air **Date Received:** NA

Sample Name: Duplicate Lab Control Sample **Units:** pg
Lab Code: EQ2100133-03 **Basis:** NA

Polychlorinated Dibenz-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23 **Date Analyzed:** 03/21/21 08:42
Prep Method: Method **Date Extracted:** 3/17/21
Sample Amount: 0.5000Sample **Instrument Name:** E-HRMS-08
GC Column: DB-5MSUI

Data File Name: P625479 **Blank File Name:** P625473
ICAL Date: 12/04/20 **Cal Ver. File Name:** P625470

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
Total Tetra-Dioxins	427		10.3	10.3	0.80		1
Total Penta-Dioxins	2330		3.77	50.0	1.52		1
Total Hexa-Dioxins	6170		2.95	50.0	1.22		1
Total Hepta-Dioxins	2010		5.04	50.0	1.03		1
Total Tetra-Furans	405		5.89	10.0	0.77		1
Total Penta-Furans	4400		3.46	50.0			1
Total Hexa-Furans	8980		2.87	50.0	1.20		1
Total Hepta-Furans	4390		5.20	50.0	0.98		1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client: Bison Engineering, Incorporated
Project: Tucson Iron & Metals/TIM220419
Sample Matrix: Air
Sample Name: Duplicate Lab Control Sample
Lab Code: EQ2100133-03

Service Request: E2100264
Date Collected: NA
Date Received: NA

Units: Percent
Basis: NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23
Prep Method: Method
Sample Amount: 0.5000Sample

Date Analyzed: 03/21/21 08:42
Date Extracted: 3/17/21
Instrument Name: E-HRMS-08
GC Column: DB-5MSUI

Data File Name: P625479
ICAL Date: 12/04/20

Blank File Name: P625473
Cal Ver. File Name: P625470

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	723.633	36	Y	40-130	0.77	1.029
13C-1,2,3,7,8-PeCDD	2000	1015.610	51		40-130	1.61	1.241
13C-1,2,3,6,7,8-HxCDD	2000	1186.633	59		40-130	1.23	0.993
13C-1,2,3,4,6,7,8-HpCDD	2000	1021.835	51		25-130	1.04	1.071
13C-OCDD	4000	1154.451	29		25-130	0.87	1.140
13C-2,3,7,8-TCDF	2000	801.056	40		40-130	0.77	0.989
13C-1,2,3,7,8-PeCDF	2000	967.512	48		40-130	1.52	1.188
13C-1,2,3,6,7,8-HxCDF	2000	949.720	47		40-130	0.52	0.971
13C-1,2,3,4,6,7,8-HpCDF	2000	913.072	46		25-130	0.42	1.045
37Cl-2,3,7,8-TCDD	2000	2019.140	101		70-130	NA	1.001
13C-1,2,3,4,7,8-HxCDD	2000	1841.901	92		70-130	1.25	0.998
13C-2,3,4,7,8-PeCDF	2000	2015.641	101		70-130	1.57	1.034
13C-1,2,3,4,7,8-HxCDF	2000	2292.805	115		70-130	0.52	0.997
13C-1,2,3,4,7,8,9-HpCDF	2000	1902.705	95		70-130	0.41	1.036
13C-1,2,3,7,8,9-HxCDF	2000	1035.930	52		40-130	0.51	1.008

APPENDIX D: PLANT OPERATING RECORDS

MINUTE EMISSIONS

COMPANY: AMCEP
 LOCATION: Tucson AZ.
 SOURCE: Contraband Incinerator
 CEMS ID: 1234567
 DATE CREATED: 03/16/2021 @ 14:55
 PERIOD: 03/16/2021 09:50 - 03/16/2021 10:55

DATE-TIME	PROCESS CODE	SOURCE ON (MINS)	DRY O2 (%)	DRY CO (PPM)	CO2 (%)	CO @ 7% (PPM)	AFTERTURNER TEMPERATURE (DEG F)	DUST COLLECTOR DP (IN H2O)	MOISTURE (PPM)	DAS DOWN (MINS)
03/16/2021 09:50	8	1	18.2	1.9	0.0	10.0	1650.4	3.0	0	0
03/16/2021 09:51	8	1	18.2	2.0	0.0	10.1	1701.3	3.1	0	0
03/16/2021 09:52	8	1	18.1	2.0	0.0	9.8	1729.2	3.1	0	0
03/16/2021 09:53	8	1	18.1	1.8	0.0	8.7	1743.5	3.1	0	0
03/16/2021 09:54	8	1	18.1	1.6	0.0	7.9	1735.6	3.1	0	0
03/16/2021 09:55	8	1	18.1	1.6	0.0	7.9	1756.6	3.1	0	0
03/16/2021 09:56	8	1	18.1	1.7	0.0	8.3	1764.5	3.2	0	0
03/16/2021 09:57	8	1	18.1	1.7	0.0	8.5	1657.2	3.3	0	0
03/16/2021 09:58	8	1	18.4	16.4	0.0	96.0	1500.4	3.1	0	0
03/16/2021 09:59	8	1	18.6	98.3	0.0	601.6	1407.3	3.2	0	0
03/16/2021 10:00	8	1	18.7	118.7	0.0	733.4	1347.5	3.0	0	0
03/16/2021 10:01	8	1	18.7	139.6	0.0	866.3	1337.1	3.1	0	0
03/16/2021 10:02	8	1	18.4	152.8	0.0	851.7	1365.9	3.1	0	0
03/16/2021 10:03	8	1	18.3	69.0	0.0	368.8	1404.5	3.3	0	0
03/16/2021 10:04	8	1	18.3	35.6	0.0	188.1	1438.1	3.3	0	0
03/16/2021 10:05	8	1	18.2	21.2	0.0	109.7	1477.1	3.6	0	0
03/16/2021 10:06	8	1	18.3	14.4	0.0	79.8	1427.8	3.5	0	0
03/16/2021 10:07	8	1	18.5	136.0	0.0	775.1	1411.0	3.3	0	0
03/16/2021 10:08	8	1	18.3	109.2	0.0	583.6	1445.7	3.3	0	0
03/16/2021 10:09	8	1	18.3	26.3	0.0	138.7	1466.3	3.3	0	0
03/16/2021 10:10	8	1	18.3	15.8	0.0	83.0	1475.9	3.8	0	0
03/16/2021 10:11	8	1	18.4	32.7	0.0	185.8	1412.3	3.7	0	0
03/16/2021 10:12	8	1	18.5	197.5	0.0	1130.7	1407.5	3.7	0	0
03/16/2021 10:13	8	1	18.2	124.9	0.0	664.0	1477.5	3.9	0	0
03/16/2021 10:14	8	1	18.2	15.6	0.0	80.1	1546.3	4.0	0	0
03/16/2021 10:15	8	1	18.1	6.5	0.0	32.5	1635.4	4.2	0	0
03/16/2021 10:16	8	1	18.1	4.1	0.0	20.5	1669.2	4.2	0	0
03/16/2021 10:17	8	1	18.1	5.3	0.0	25.6	1666.1	4.2	0	0
03/16/2021 10:18	8	1	18.1	9.2	0.0	46.3	1686.8	4.2	0	0
03/16/2021 10:19	8	1	18.1	12.5	0.0	62.1	1728.5	4.3	0	0
03/16/2021 10:20	8	1	18.2	3.5	0.0	18.1	1761.8	4.3	0	0
03/16/2021 10:21	8	1	18.0	3.3	0.0	16.2	1705.8	4.3	0	0
03/16/2021 10:22	8	1	18.1	3.1	0.0	15.5	1634.9	4.3	0	0
03/16/2021 10:23	8	1	18.2	6.7	0.0	35.4	1570.5	4.0	0	0
03/16/2021 10:24	8	1	18.4	20.5	0.0	115.0	1490.6	4.0	0	0
03/16/2021 10:25	8	1	18.6	44.3	0.0	265.0	1435.4	4.0	0	0
03/16/2021 10:26	8	1	18.5	85.5	0.0	495.6	1414.8	3.6	0	0
03/16/2021 10:27	8	1	18.4	98.8	0.0	550.3	1483.0	3.5	0	0
03/16/2021 10:28	8	1	18.2	30.9	0.0	159.2	1604.6	3.5	0	0
03/16/2021 10:29	8	1	18.1	3.3	0.0	16.6	1715.2	3.5	0	0
03/16/2021 10:30	8	1	18.1	1.6	0.0	7.9	1801.3	3.5	0	0
03/16/2021 10:31	8	1	18.0	2.6	0.0	12.9	1646.3	3.5	0	0
03/16/2021 10:32	8	1	18.6	22.2	0.0	134.1	1622.9	4.2	0	0
03/16/2021 10:33	8	1	18.2	9.6	0.0	49.1	1614.0	4.2	0	0
03/16/2021 10:34	8	1	18.2	10.8	0.0	56.4	1533.1	3.8	0	0
03/16/2021 10:35	8	1	18.5	44.1	0.0	251.8	1488.0	3.7	0	0
03/16/2021 10:36	8	1	18.3	31.9	0.0	174.5	1514.2	3.9	0	0
03/16/2021 10:37	8	1	18.3	15.8	0.0	83.2	1514.5	4.0	0	0
03/16/2021 10:38	8	1	18.3	30.3	0.0	162.7	1494.3	3.9	0	0
03/16/2021 10:39	8	1	18.3	26.5	0.0	142.5	1509.5	3.8	0	0
03/16/2021 10:40	8	1	18.3	10.0	0.0	53.3	1514.2	4.0	0	0
03/16/2021 10:41	8	1	18.2	10.2	0.0	52.8	1539.2	4.0	0	0
03/16/2021 10:42	8	1	18.2	30.3	0.0	153.2	1581.6	4.3	0	0

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2021 Tucson Iron and Metal Contraband Incinerator Dioxin and Furan Compliance Retest

1 of 2

DATE-TIME	PROCESS CODE	SOURCE ON (MINS)	DRY O2 (%)	DRY CO (PPM)	CO2 (%)	CO @ 7% (PPM)	AFTERTURNER TEMPERATURE (DEG F)	DUST COLLECTOR DP (IN H2O)	MOISTURE (PPM)	DAS DOWN (MINS)
03/16/2021 10:43	8	1	18.1	38.5	0.0	191.0	1540.8	4.4	0	0
03/16/2021 10:44	8	1	18.2	145.1	0.0	738.8	1552.3	4.5	0	0
03/16/2021 10:45	8	1	18.1	123.3	0.0	621.4	1552.7	4.6	0	0
03/16/2021 10:46	8	1	18.1	281.0	0.0	1414.5	1563.0	4.6	0	0
03/16/2021 10:47	8	1	18.0	173.3	0.0	827.6	1567.2	4.6	0	0
03/16/2021 10:48	8	1	18.0	45.8	0.0	216.4	1595.5	4.7	0	0
03/16/2021 10:49	8	1	17.9	43.8	0.0	202.6	1633.4	4.6	0	0
03/16/2021 10:50	8	1	17.8	6.1	0.0	27.3	1657.8	4.5	0	0
03/16/2021 10:51	8	1	17.9	9.2	0.0	43.1	1620.6	4.5	0	0
03/16/2021 10:52	8	1	18.1	24.7	0.0	124.9	1573.8	4.4	0	0
03/16/2021 10:53	8	1	18.2	70.3	0.0	358.8	1525.0	4.2	0	0
03/16/2021 10:54	8	1	18.4	28.3	0.0	159.1	1469.5	4.2	0	0
03/16/2021 10:55	8	1	18.6	17.2	0.0	105.2	1437.9	4.2	0	0

DATE-TIME	PROCESS CODE	SOURCE ON (MINS)	DRY O2 (%)	DRY CO (PPM)	CO2 (%)	CO @ 7% (PPM)	AFTERTURNER TEMPERATURE (DEG F)	DUST COLLECTOR DP (IN H2O)	MOISTURE (PPM)	DAS DOWN (MINS)
AVERAGE			18.2	44.4	0.0	240.1	1559.9	3.8	0	
TOTAL		66								0
MIN VALUE			17.8	1.6	0.0	7.9	1337.1	3.0	0	
MIN TIME			10:50	09:54	09:50	09:54	10:01	09:50	09:50	
MIN DATE			03/16/2021	03/16/2021	03/16/2021	03/16/2021	03/16/2021	03/16/2021	03/16/2021	
MAX VALUE			18.7	281.0	0.0	1414.5	1801.3	4.7	0	
MAX TIME			10:01	10:46	10:55	10:46	10:30	10:48	10:55	
MAX DATE			03/16/2021	03/16/2021	03/16/2021	03/16/2021	03/16/2021	03/16/2021	03/16/2021	

MINUTE EMISSIONS

COMPANY: AMCEP
 LOCATION: Tucson AZ.
 SOURCE: Contraband Incinerator
 CEMS ID: 1234567
 DATE CREATED: 03/16/2021 @ 14:56
 PERIOD: 03/16/2021 11:26 - 03/16/2021 12:34

DATE-TIME	PROCESS CODE	SOURCE ON (MINS)	DRY O2 (%)	DRY CO (PPM)	CO2 (%)	CO @ 7% (PPM)	AFTERTURNER TEMPERATURE (DEG F)	DUST COLLECTOR DP (IN H2O)	MOISTURE (PPM)	DAS DOWN (MINS)
03/16/2021 11:26	8	1	18.6	9.9	0.0	60.2	1515.4	5.0	0	0
03/16/2021 11:27	8	1	18.6	14.3	0.0	87.1	1479.0	4.4	0	0
03/16/2021 11:28	8	1	18.6	21.0	0.0	125.9	1487.2	4.4	0	0
03/16/2021 11:29	8	1	18.4	9.1	0.0	50.7	1579.9	4.5	0	0
03/16/2021 11:30	8	1	18.5	2.3	0.0	13.1	1653.1	4.4	0	0
03/16/2021 11:31	8	1	18.3	1.2	0.0	6.5	1682.5	4.5	0	0
03/16/2021 11:32	8	1	18.4	1.1	0.0	6.1	1703.7	4.5	0	0
03/16/2021 11:33	8	1	18.4	1.0	0.0	5.5	1701.8	4.6	0	0
03/16/2021 11:34	8	1	18.4	1.0	0.0	5.5	1672.3	4.6	0	0
03/16/2021 11:35	8	1	18.5	1.0	0.0	5.7	1622.5	4.6	0	0
03/16/2021 11:36	8	1	18.6	1.1	0.0	6.7	1559.8	4.6	0	0
03/16/2021 11:37	8	1	18.7	8.9	0.0	55.9	1571.7	4.6	0	0
03/16/2021 11:38	8	1	18.5	3.2	0.0	19.0	1531.1	4.6	0	0
03/16/2021 11:39	8	1	18.7	13.9	0.0	90.3	1478.6	4.6	0	0
03/16/2021 11:40	8	1	18.7	21.0	0.0	134.6	1441.7	4.7	0	0
03/16/2021 11:41	8	1	18.8	22.2	0.0	148.3	1410.6	4.8	0	0
03/16/2021 11:42	8	1	19.1	54.9	0.0	418.9	1387.3	4.9	0	0
03/16/2021 11:43	8	1	19.1	41.6	0.0	317.8	1372.9	4.8	0	0
03/16/2021 11:44	8	1	19.3	68.9	0.0	598.7	1353.4	5.3	0	0
03/16/2021 11:45	8	1	19.5	205.8	0.0	2099.8	1327.9	5.3	0	0
03/16/2021 11:46	8	1	19.6	389.1	0.0	4159.9	1307.6	4.4	0	0
03/16/2021 11:47	8	1	19.6	405.9	0.0	4239.7	1308.8	3.9	0	0
03/16/2021 11:48	8	1	19.5	334.6	0.0	3303.0	1324.5	4.6	0	0
03/16/2021 11:49	8	1	19.0	86.7	0.0	682.4	1341.7	4.4	0	0
03/16/2021 11:50	8	1	18.7	28.3	0.0	182.3	1374.0	4.5	0	0
03/16/2021 11:51	8	1	18.5	17.5	0.0	102.8	1381.0	4.1	0	0
03/16/2021 11:52	8	1	18.6	18.9	0.0	112.4	1413.1	4.4	0	0
03/16/2021 11:53	8	1	18.4	19.7	0.0	113.7	1421.7	4.4	0	0
03/16/2021 11:54	8	1	18.5	81.2	0.0	458.7	1441.2	4.4	0	0
03/16/2021 11:55	8	1	18.3	99.9	0.0	530.1	1499.8	4.4	0	0
03/16/2021 11:56	8	1	18.2	22.9	0.0	117.3	1588.6	4.4	0	0
03/16/2021 11:57	8	1	18.1	3.1	0.0	15.4	1659.3	4.5	0	0
03/16/2021 11:58	8	1	18.2	1.6	0.0	8.2	1674.6	5.0	0	0
03/16/2021 11:59	8	1	18.2	5.3	0.0	27.4	1628.8	4.5	0	0
03/16/2021 12:00	8	1	18.2	10.3	0.0	52.9	1636.2	4.5	0	0
03/16/2021 12:01	8	1	18.2	4.2	0.0	21.9	1634.1	5.0	0	0
03/16/2021 12:02	8	1	18.3	4.1	0.0	22.0	1648.9	5.2	0	0
03/16/2021 12:03	8	1	18.3	4.3	0.0	22.8	1606.9	5.2	0	0
03/16/2021 12:04	8	1	18.3	15.3	0.0	83.4	1556.9	5.2	0	0
03/16/2021 12:05	8	1	18.6	16.6	0.0	97.9	1509.5	5.2	0	0
03/16/2021 12:06	8	1	18.6	23.0	0.0	138.9	1483.7	4.9	0	0
03/16/2021 12:07	8	1	18.4	35.3	0.0	200.8	1547.7	4.8	0	0
03/16/2021 12:08	8	1	18.2	11.0	0.0	56.5	1623.2	4.6	0	0
03/16/2021 12:09	8	1	18.2	43.7	0.0	223.7	1656.3	5.3	0	0
03/16/2021 12:10	8	1	18.3	27.8	0.0	146.5	1655.2	5.3	0	0
03/16/2021 12:11	8	1	18.2	37.8	0.0	195.0	1671.5	5.3	0	0
03/16/2021 12:12	8	1	18.2	9.3	0.0	48.0	1663.3	5.4	0	0
03/16/2021 12:13	8	1	18.2	2.6	0.0	13.4	1607.5	5.4	0	0
03/16/2021 12:14	8	1	18.5	2.6	0.0	15.0	1556.3	4.7	0	0
03/16/2021 12:15	8	1	18.6	3.8	0.0	22.3	1561.0	4.6	0	0
03/16/2021 12:16	8	1	18.3	4.9	0.0	25.8	1620.9	4.9	0	0
03/16/2021 12:17	8	1	18.2	3.9	0.0	20.4	1661.1	5.2	0	0
03/16/2021 12:18	8	1	18.3	2.3	0.0	11.9	1631.7	5.4	0	0

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2021 Tucson Iron and Metal Contraband Incinerator Dioxin and Furan Compliance Retest

1 of 2

DATE-TIME	PROCESS CODE	SOURCE ON (MINS)	DRY O2 (%)	DRY CO (PPM)	CO2 (%)	CO @ 7% (PPM)	AFTERTURNER TEMPERATURE (DEG F)	DUST COLLECTOR DP (IN H2O)	MOISTURE (PPM)	DAS DOWN (MINS)
03/16/2021 12:19	8	1	18.5	1.6	0.0	9.2	1570.8	5.0	0	0
03/16/2021 12:20	8	1	18.5	2.2	0.0	12.8	1566.0	4.7	0	0
03/16/2021 12:21	8	1	18.3	3.2	0.0	17.0	1622.4	4.8	0	0
03/16/2021 12:22	8	1	18.2	2.9	0.0	15.3	1637.6	5.2	0	0
03/16/2021 12:23	8	1	18.3	1.8	0.0	9.5	1622.9	5.6	0	0
03/16/2021 12:24	8	1	18.5	1.2	0.0	6.8	1595.9	5.3	0	0
03/16/2021 12:25	8	1	18.3	1.8	0.0	9.5	1642.6	5.0	0	0
03/16/2021 12:26	8	1	18.1	2.1	0.0	10.5	1667.4	4.9	0	0
03/16/2021 12:27	8	1	18.2	1.8	0.0	9.3	1628.8	4.9	0	0
03/16/2021 12:28	8	1	18.5	1.4	0.0	7.8	1570.9	4.9	0	0
03/16/2021 12:29	8	1	18.7	1.7	0.0	10.4	1551.1	4.8	0	0
03/16/2021 12:30	8	1	18.5	2.2	0.0	12.8	1592.5	4.8	0	0
03/16/2021 12:31	8	1	18.2	2.3	0.0	12.1	1621.7	4.9	0	0
03/16/2021 12:32	8	1	18.2	1.7	0.0	8.9	1635.6	4.8	0	0
03/16/2021 12:33	8	1	18.2	1.8	0.0	5.4	1633.9	4.8	0	0
03/16/2021 12:34	8	1	18.2	0.9	0.0	4.7	1622.0	4.8	0	0

DATE-TIME	PROCESS CODE	SOURCE ON (MINS)	DRY O2 (%)	DRY CO (PPM)	CO2 (%)	CO @ 7% (PPM)	AFTERTURNER TEMPERATURE (DEG F)	DUST COLLECTOR DP (IN H2O)	MOISTURE (PPM)	DAS DOWN (MINS)
AVERAGE			18.5	33.5	0.0	288.3	1553.8	4.8	0	
TOTAL		69								0
MIN VALUE			18.1	0.9	0.0	4.7	1307.6	3.9	0	
MIN TIME			11:57	12:34	11:26	12:34	11:46	11:47	11:26	
MIN DATE			03/16/2021	03/16/2021	03/16/2021	03/16/2021	03/16/2021	03/16/2021	03/16/2021	03/16/2021
MAX VALUE			19.6	405.9	0.0	4239.7	1703.7	5.6	0	
MAX TIME			11:47	11:47	12:34	11:47	11:32	12:23	12:34	
MAX DATE			03/16/2021	03/16/2021	03/16/2021	03/16/2021	03/16/2021	03/16/2021	03/16/2021	03/16/2021

MINUTE EMISSIONS

COMPANY: AMCEP
 LOCATION: Tucson AZ.
 SOURCE: Contraband Incinerator
 CEMS ID: 1234567
 DATE CREATED: 03/16/2021 @ 14:56
 PERIOD: 03/16/2021 12:51 - 03/16/2021 13:56

DATE-TIME	PROCESS CODE	SOURCE ON (MINS)	DRY O2 (%)	DRY CO (PPM)	CO2 (%)	CO @ 7% (PPM)	AFTERTURNER TEMPERATURE (DEG F)	DUST COLLECTOR DP (IN H2O)	MOISTURE (PPM)	DAS DOWN (MINS)
03/16/2021 12:51	8	1	18.3	0.8	0.0	4.3	1630.4	4.9	0	0
03/16/2021 12:52	8	1	18.4	0.9	0.0	5.0	1636.9	5.0	0	0
03/16/2021 12:53	8	1	18.3	0.9	0.0	4.7	1652.7	4.7	0	0
03/16/2021 12:54	8	1	18.2	0.9	0.0	4.6	1648.5	4.9	0	0
03/16/2021 12:55	8	1	18.4	0.8	0.0	4.8	1584.8	4.9	0	0
03/16/2021 12:56	8	1	18.7	4.6	0.0	29.2	1540.5	4.8	0	0
03/16/2021 12:57	8	1	18.6	9.8	0.0	59.1	1523.1	4.8	0	0
03/16/2021 12:58	8	1	18.5	7.7	0.0	45.6	1542.6	5.0	0	0
03/16/2021 12:59	8	1	18.2	2.0	0.0	10.7	1587.7	5.1	0	0
03/16/2021 13:00	8	1	18.8	1.2	0.0	8.4	1646.8	6.3	0	0
03/16/2021 13:01	8	1	19.2	0.9	0.0	7.8	1715.7	6.3	0	0
03/16/2021 13:02	8	1	19.2	0.7	0.0	5.8	1710.6	6.2	0	0
03/16/2021 13:03	8	1	18.8	0.7	0.0	4.9	1629.8	5.9	0	0
03/16/2021 13:04	8	1	18.9	1.3	0.0	9.0	1634.3	5.8	0	0
03/16/2021 13:05	8	1	18.4	2.1	0.0	11.3	1670.0	6.0	0	0
03/16/2021 13:06	8	1	18.4	2.1	0.0	11.7	1679.1	6.2	0	0
03/16/2021 13:07	8	1	18.4	9.0	0.0	49.8	1645.1	6.2	0	0
03/16/2021 13:08	8	1	18.5	4.2	0.0	24.7	1664.1	6.3	0	0
03/16/2021 13:09	8	1	18.3	3.1	0.0	16.9	1701.6	6.3	0	0
03/16/2021 13:10	8	1	18.3	8.3	0.0	44.6	1728.6	6.3	0	0
03/16/2021 13:11	8	1	18.4	3.0	0.0	16.3	1681.3	6.3	0	0
03/16/2021 13:12	8	1	18.7	3.9	0.0	24.4	1621.3	6.3	0	0
03/16/2021 13:13	8	1	18.7	3.3	0.0	20.8	1578.2	6.3	0	0
03/16/2021 13:14	8	1	18.7	4.0	0.0	26.1	1584.1	6.3	0	0
03/16/2021 13:15	8	1	18.5	3.7	0.0	21.4	1618.6	6.3	0	0
03/16/2021 13:16	8	1	18.3	2.8	0.0	15.0	1664.4	6.4	0	0
03/16/2021 13:17	8	1	18.3	30.6	0.0	57.4	1690.0	6.4	0	0
03/16/2021 13:18	8	1	18.3	4.6	0.0	24.6	1711.2	6.4	0	0
03/16/2021 13:19	8	1	18.3	2.9	0.0	15.5	1726.2	6.4	0	0
03/16/2021 13:20	8	1	18.3	2.1	0.0	11.1	1736.9	6.4	0	0
03/16/2021 13:21	8	1	18.2	1.3	0.0	6.8	1718.1	6.4	0	0
03/16/2021 13:22	8	1	18.4	1.0	0.0	5.4	1697.6	6.4	0	0
03/16/2021 13:23	8	1	18.5	1.1	0.0	6.2	1691.8	6.4	0	0
03/16/2021 13:24	8	1	18.3	1.2	0.0	6.4	1730.4	6.4	0	0
03/16/2021 13:25	8	1	18.3	1.3	0.0	7.0	1753.2	6.4	0	0
03/16/2021 13:26	8	1	18.3	2.2	0.0	11.7	1745.3	6.4	0	0
03/16/2021 13:27	8	1	18.3	2.8	0.0	14.7	1699.6	6.4	0	0
03/16/2021 13:28	8	1	18.3	2.5	0.0	13.3	1685.6	6.4	0	0
03/16/2021 13:29	8	1	18.3	1.8	0.0	9.8	1662.3	6.5	0	0
03/16/2021 13:30	8	1	18.5	1.9	0.0	11.0	1643.9	6.5	0	0
03/16/2021 13:31	8	1	18.7	2.1	0.0	12.8	1611.0	6.5	0	0
03/16/2021 13:32	8	1	18.6	1.8	0.0	11.9	1597.9	6.5	0	0
03/16/2021 13:33	8	1	18.6	2.3	0.0	13.7	1609.4	6.5	0	0
03/16/2021 13:34	8	1	18.6	3.1	0.0	18.4	1669.3	6.5	0	0
03/16/2021 13:35	8	1	18.4	3.2	0.0	17.7	1715.4	6.6	0	0
03/16/2021 13:36	8	1	18.4	2.7	0.0	15.3	1734.5	6.5	0	0
03/16/2021 13:37	8	1	18.3	2.7	0.0	14.3	1759.3	6.6	0	0
03/16/2021 13:38	8	1	18.3	2.8	0.0	15.2	1795.3	6.6	0	0
03/16/2021 13:39	8	1	18.3	2.4	0.0	12.7	1785.5	6.6	0	0
03/16/2021 13:40	8	1	18.5	4.4	0.0	26.5	1720.7	6.6	0	0
03/16/2021 13:41	8	1	18.6	9.8	0.0	60.9	1807.6	6.6	0	0
03/16/2021 13:42	8	1	18.3	2.1	0.0	10.8	1810.8	6.7	0	0
03/16/2021 13:43	8	1	18.7	9.6	0.0	61.6	1700.7	6.6	0	0

TIM220419

2021 Tucson Iron and Metal Contraband Incinerator Dioxin and Furan Compliance Retest

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1 of 2

ED_005878_00000214-00101

DATE-TIME	PROCESS CODE	SOURCE ON (MINS)	DRY O2 (%)	DRY CO (PPM)	CO2 (%)	CO @ 7% (PPM)	AFTERTURNER TEMPERATURE (DEG F)	DUST COLLECTOR DP (IN H2O)	MOISTURE (PPM)	DAS DOWN (MINS)
03/16/2021 13:44	8	1	19.0	6.5	0.0	47.0	1746.5	6.7	0	0
03/16/2021 13:45	8	1	18.3	2.5	0.0	13.6	1758.1	6.6	0	0
03/16/2021 13:46	8	1	18.5	2.2	0.0	13.0	1743.2	6.6	0	0
03/16/2021 13:47	8	1	18.4	11.9	0.0	65.2	1724.1	6.6	0	0
03/16/2021 13:48	8	1	18.2	10.9	0.0	57.1	1726.1	6.7	0	0
03/16/2021 13:49	8	1	18.5	11.4	0.0	65.7	1747.6	6.7	0	0
03/16/2021 13:50	8	1	18.5	5.4	0.0	30.6	1783.6	6.7	0	0
03/16/2021 13:51	8	1	18.4	4.0	0.0	22.6	1789.7	6.7	0	0
03/16/2021 13:52	8	1	18.5	3.4	0.0	19.9	1729.9	6.7	0	0
03/16/2021 13:53	8	1	18.5	3.6	0.0	21.4	1796.4	6.7	0	0
03/16/2021 13:54	8	1	18.3	3.1	0.0	17.0	1786.9	6.7	0	0
03/16/2021 13:55	8	1	18.6	2.2	0.0	13.2	1742.9	6.7	0	0
03/16/2021 13:56	8	1	18.4	1.9	0.0	10.9	1801.8	6.7	0	0

DATE-TIME	PROCESS CODE	SOURCE ON (MINS)	DRY O2 (%)	DRY CO (PPM)	CO2 (%)	CO @ 7% (PPM)	AFTERTURNER TEMPERATURE (DEG F)	DUST COLLECTOR DP (IN H2O)	MOISTURE (PPM)	DAS DOWN (MINS)
AVERAGE			18.5	3.6	0.0	20.9	1691.0	6.2	0	
TOTAL		66								0
MIN VALUE			18.2	0.7	0.0	4.3	1523.1	6.7	0	
MIN TIME			12:54	13:02	12:51	12:51	12:57	12:53	12:51	
MIN DATE			03/16/2021	03/16/2021	03/16/2021	03/16/2021	03/16/2021	03/16/2021	03/16/2021	
MAX VALUE			19.2	11.9	0.0	65.7	1810.8	6.7	0	
MAX TIME			13:02	13:47	13:56	13:49	13:42	13:56	13:56	
MAX DATE			03/16/2021	03/16/2021	03/16/2021	03/16/2021	03/16/2021	03/16/2021	03/16/2021	

APPENDIX E: CALIBRATIONS AND CERTIFICATIONS



American Association for Laboratory Accreditation

Accredited Air Emission Testing Body

A2LA has accredited

BISON ENGINEERING, INC.

In recognition of the successful completion of the joint A2LA and Stack Testing Accreditation Council (STAC) evaluation process, this laboratory is accredited to perform testing activities in compliance with ASTM D7036:2004 - Standard Practice for Competence of Air Emission Testing Bodies.

Presented this 15th day of January 2020.

A handwritten signature in black ink, appearing to read "John Doe".

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 4675.01
Valid to November 30, 2021

This accreditation program is not included under the A2LA ILAC Mutual Recognition Arrangement.



Field Barometer
Calibration Form

Project #: TIM220419

IN OFFICE PRE-TEST CALIBRATION

Reference Standard Used:

Standard ID	Serial number	Adjusted on:	Calibration due:
Tucson Mercury Barometer	TUC01	3.15.2021	Must be properly adjusted prior to every use

Field Barometer Verification:

Barometer ID: TTB-2

Reference Value (in Hg)	Observed (in Hg)	Correction*	Tolerance (+/- 0.1 in Hg)**
27.38	27.45	0.07	PASS

*Correction is the difference between the observed and reference values

**EPA Method 5, Section 6.1.2 and EPA Method 2, Section 6.5.

Technician: LCE

Date: 3.15.2021

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Version: 7/30/2019



Field Balance and Weights Calibration Form

Project #: TIM220419

IN OFFICE PRE-TEST CHECKS

Date: 3.15.2021

Performed by: LCE

Environmental conditions in the lab:

Temperature °F	Pressure "Hg
72	27.32

Reference Standard(s) Used:

Standard ID	Serial number(s)	Calibrated on:	Calibration due:
Troemner	4000021445	7/23/2020	7/23/2021

Verification of Field Balance Against Reference Standard Weights:

Balance ID: WSS-1

Nominal Value (g)	Observed (g)	Correction*	Tolerance (+/- 0.5g)**
200	200.0	0.0	PASS
500	500.0	0.0	PASS
1000	1000.0	0.0	PASS
2000	1999.7	0.3	PASS

Verification of Field Standard Weights :

Weights ID: STDW1

Nominal Value (g)	Observed (g)	Correction*	Tolerance (+/- 0.5g)**
200	200.0	0.0	PASS
500	500.0	0.0	PASS
1000	999.8	0.2	PASS
2000	1999.6	0.4	PASS

*Correction is the difference between the observed and nominal mass values

**EPA Method 5, Section 6.3.4

Page 1 of 2

ONSITE BALANCE VERIFICATION

Date: 3.16.2021

Performed by: LCE

Environmental conditions onsite:

Temperature °F	Pressure "Hg
55	27.24

Field Balance Verification:

Balance ID: WSS-1

Weights ID: STDW1

Nominal Value (g)	Observed (g)	Correction*	PASS/FAIL Tolerance (+/- 0.5g)
500	500.0	0.0	PASS
200	200.0	0.0	PASS
1000	1000.1	0.1	PASS
2000	2000.0	0.0	PASS

*Correction is the difference between the observed and nominal mass values

Technician: LCE

Date: 3.16.2021

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Version: 7/30/2019

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Field Caliper
Calibration Form

Project #: TIM220419

IN OFFICE PRE-TEST CHECKS

Date: 3.15.2021

Performed by: LCE

Reference Standard Used:

Standard ID	Serial number	Calibrated on:	Calibration due:
Mitutoyo	A17170739	1/25/2021	1/25/2022

Caliper Verification:

Field Caliper ID: TMC-2

Inside Diameter

Reference Value (inches)	Observed (inches)	Correction*	Tolerance (+/- 0.0050 inch)
0.375	0.375	0.000	PASS

*Correction is the difference between the observed and reference values

Outside Diameter

Reference Value (inches)	Observed (inches)	Correction*	Tolerance (+/- 0.0050 inch)
0.500	0.500	0.000	PASS

*Correction is the difference between the observed and reference values

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Version: 7/30/2019



Thermocouple
Calibration Form

Project #: TIM220419

POST-TEST CHECKS

Reference Standard Used:

Standard ID	Serial number(s)	Calibrated on:	Calibration due:
Omega	T289858	6/11/2020	6/11/2021

Temperature Meter Mode:

Thermocouple ID	Continuity (x = pass)	Observed Temp (°F)	Reference Temp (°F)	Correction*	Tolerance (+/- 2°F)**
Stack Temp (T-6-2)	x	75.2	76.3	1.1	PASS
Probe Liner (T-6-2)	x	74.8		1.5	PASS
Hot Box (HB-2)	x	76.9		0.6	PASS
Condenser (8473)	x	75.6		0.7	PASS
DGM Outlet (Box 8)	x	74.8		1.5	PASS
DGM Inlet (Box 8)	x	74.6		1.7	PASS

Calibration Output Mode:

Switch the Omega from 'Meter Input' to 'Calibration Output' mode. Test the meter box temperature readout by sending a voltage output equivalent to a temperature similar to stack temperature.

Meter Box ID	Reference Temp Output (°F)	Meter Box Readout (°F)	Correction*	Tolerance (+/- 2°F)**
Box 8	76.7	77	0.3	PASS

*Correction is the difference between the observed and reference values

**Alt-011 6/21/94 Alternative Method 2 Thermocouple Calibration Procedure:

Continuity Check - confirm the thermocouple is reading at the tip by subjecting it to a change in temperature (e.g. removing it from the stack, or touching it with a your hand).

Single-point temperature check at ambient temperature, or any temperature, within the range specified by the manufacturer.

Technician: LCE

Date: 3/17/2021

Y:\SOURCE\Calibrations\BLANK CALIBRATION FORMS\Calibration Form Combined

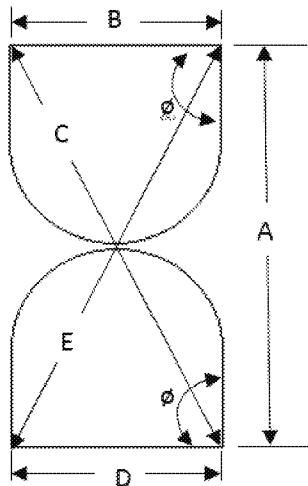
Version: 7/30/2019



S-Type Pitot Tube Geometric Calibration

Pitot ID: T-PT-29

Date of Geometric Calibration (< 6 months): 2/2/2021



A	0.94
B	0.38
C	0.97
D	0.39
E	0.96

$$\frac{a^2 + b^2 - c^2}{2ab} = \cos \phi$$

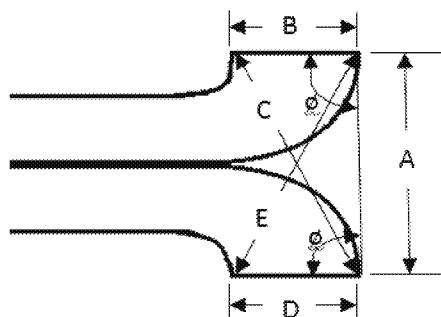
$$\frac{a^2 + d^2 - e^2}{2ad} = \cos \phi$$

ϕ	82.55
--------	-------

(80° < ϕ < 100°)

ϕ	81.84
--------	-------

(80° < ϕ < 100°)



A	0.93
B	0.59
C	1.10
D	0.58
E	1.09

$$\frac{a^2 + b^2 - c^2}{2ab} = \cos \phi$$

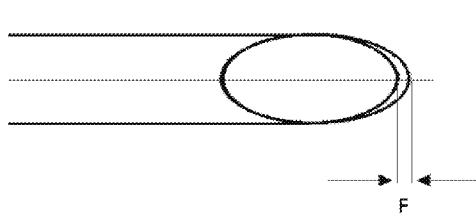
$$\frac{a^2 + d^2 - e^2}{2ad} = \cos \phi$$

ϕ	90.45
--------	-------

(85° < ϕ < 95°)

ϕ	89.79
--------	-------

(85° < ϕ < 95°)



F=	0.041
----	-------

(F < 0.125)



G=	0.000
----	-------

(G < 0.032)

Results of the Post-Test Pitot Inspection (mark with x below):

No change

Damaged

New Calibration

Technician: LCE

Date: 3.17.2021

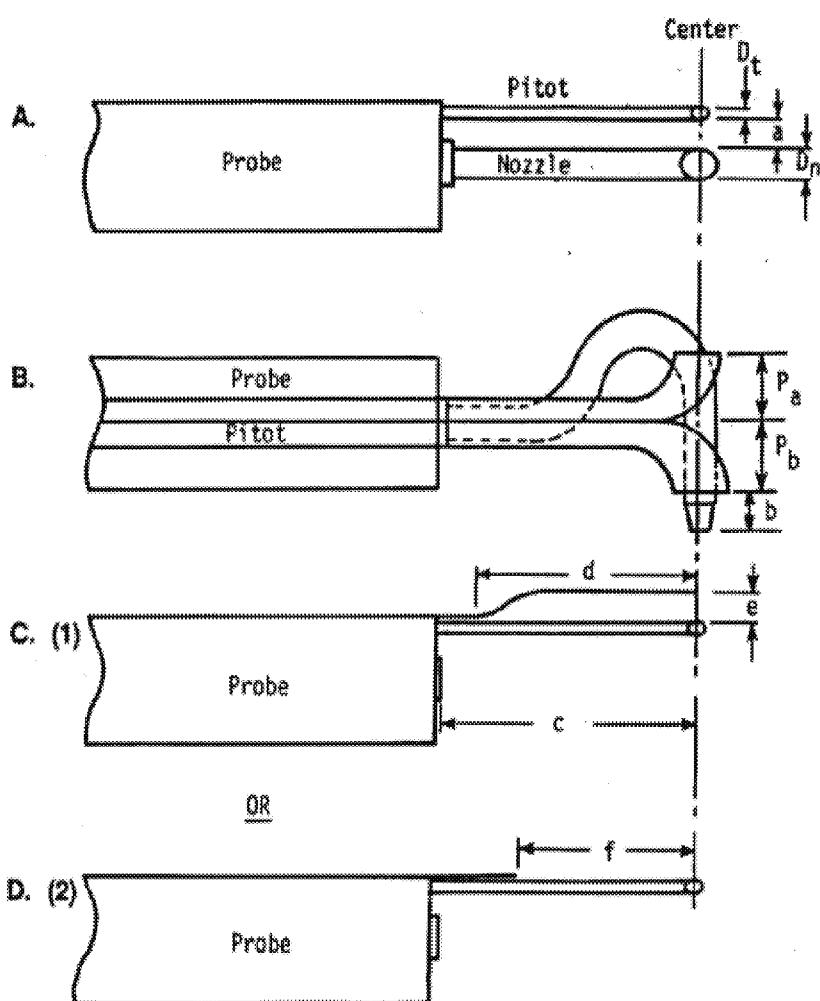


Probe Calibration

Probe ID: T-6-2
 Date of calibration (< 6 months): 2/2/2021

5 ft effective probe

6 ft total length



Measure (Inch)

	Measure (Inch)
Dt:	0.37
Dn:	0.50
a:	0.90

$$Dt = 0.187 \text{ to } 0.375$$

$$Dn = 0.5$$

$$a \geq 0.750$$

	Measure (Inch)
Pa:	0.47
Pb:	0.47
b:	0.50

$$P_a = P_b$$

$$B \geq 0$$

	Measure (Inch)
c:	4.59
d:	6.69
e:	1.12

$$c \geq 3.0$$

$$d \geq 3.0$$

$$e \geq 0.750$$

or

f:	<input type="text"/>
----	----------------------

$$f \geq 2.0$$

Results of the Post-Test Probe Inspection (mark with x below):

No change x

Damaged _____

New Calibration _____

Technician: LCE

Date: 3/17/2021

METERBOX CALIBRATION FORM
USING CALIBRATED CRITICAL ORIFICES
5-POINT ENGLISH UNITS

Meter Console Information	
Box Number	Box #8
Console Serial Number	
DGM Model Number	Itron
DGM Serial Number	028-040611-1

Calibration Conditions	
Date	Time
Barometric Pressure	27.43 in Hg
Theoretical Critical Vacuum ¹	12.95 in Hg
Calibration Technician	JPC

Factors/Conversions		
Std Temp	528	°R
Std Press	29.92	in Hg
K ₁	17.647	oR/in Hg

¹For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.

²The Critical Orifice Coefficient, K', must be entered in English units, (ft³·°R^{1/2})/(in.Hg·min).

Run Time	Calibration Data						Critical Orifice			
	DGM Orifice Elapsed (ΔH)	Volume Initial (P _m)	Volume Final (V _{mi})	Outlet Temp Initial (t _{mi})	Outlet Temp Final (t _{mf})	Serial Number	Coefficient K'	Amb Temp Initial (t _{amb})	Amb Temp Final (t _{amb})	Actual Vacuum in Hg
min	in H ₂ O	cubic feet	cubic feet	°F	°F		see above2	°F	°F	in Hg
10.0	0.30	516.752	519.835	70	71	SX-40	0.2344	69	69	23
10.0	0.58	519.835	524.390	71	71	SX-48	0.3361	69	69	22
10.0	1.00	524.390	530.265	71	72	SX-55	0.4513	69	70	20
10.0	1.70	530.265	538.185	72	72	SX-63	0.5899	70	70	19
10.0	3.40	538.185	548.815	72	73	SX-73	0.8124	70	70	16

Results									
Standardized Data				Dry Gas Meter					
Dry Gas Meter		Critical Orifice		Calibration Factor		Flowrate	ΔH @		
(V _{m(std)})	(Q _{m(std)})	(V _{cr(std)})	(Q _{cr(std)})	Value (Y)	Variation (ΔY)	Std & Corr (Q _{m(std)(corr)})	0.75 SCFM	Variation (ΔH@)	(ΔΔH@)
cubic feet	cfm	cubic feet	cfm			cfm	in H ₂ O		
2.815	0.282	2.795	0.280	0.993	0.008	0.280	1.975	0.118	
4.159	0.416	4.008	0.401	0.964	-0.021	0.401	1.858	0.001	
5.365	0.536	5.380	0.538	1.003	0.018	0.538	1.781	-0.076	
7.239	0.724	7.029	0.703	0.971	-0.014	0.703	1.779	-0.078	
9.751	0.975	9.680	0.968	0.993	0.008	0.968	1.891	0.034	
Pre-test Y	0.990	% Deviation	PASS	0.985	Y Average		1.857	ΔH@ Average	

AVERAGE Y= 0.985

AVERAGE ΔH= 1.857

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +/-0.02.
Note: For Calibration Factor H, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +/-0.20.

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR Title 40, Part 60, Appendix A-3, Method 5, 16.2.3

Signature L. Connor Everly

Date 3/21/2021

Y:\SOURCE\Calibration\BLANK CALIBRATION FORMS\High Flow Meterbox Calibration_Critical Orifice

METERBOX CALIBRATION FORM
USING CALIBRATED CRITICAL ORIFICES
5-POINT ENGLISH UNITS

Meter Console Information	
Box Number	Box #8
Console Serial Number	
DGM Model Number	Itron
DGM Serial Number	028-040611-1

Calibration Conditions				
Date	Time	17-Mar-21	14:00	
Barometric Pressure		27.41	in Hg	
Theoretical Critical Vacuum ¹		12.94	in Hg	
Calibration Technician	JPC			

Factors/Conversions		
Std Temp	528	°R
Std Press	29.92	in Hg
K ₁	17.647	oR/in Hg

¹For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.

²The Critical Orifice Coefficient, K', must be entered in English units, (ft³·°R^{1/2})/(in.Hg·min).

Run Time	Calibration Data									
	DGM Orifice Elapsed (Θ)	Volume Initial (P _m)	Volume Final (V _{mi})	Outlet Temp Initial (t _{mi})	Outlet Temp Final (t _{mf})	Serial Number	Coefficient K'	Amb Temp Initial (t _{amb})	Amb Temp Final (t _{amb})	Actual Vacuum in Hg
min	in H ₂ O	cubic feet	cubic feet	°F	°F		see above2	°F	°F	in Hg
10.0	0.30	698.565	701.660	71	72	SX-40	0.2344	73	73	23
10.0	0.58	701.660	706.085	72	72	SX-48	0.3361	73	73	22
10.0	1.00	706.085	712.040	72	72	SX-55	0.4513	73	74	20
10.0	1.70	712.040	719.910	72	73	SX-63	0.5899	74	74	19
10.0	3.40	719.910	730.490	73	74	SX-73	0.8124	74	76	17

Results									
Standardized Data				Dry Gas Meter					
Dry Gas Meter		Critical Orifice		Calibration Factor		Flowrate	ΔH @		
(V _{m(std)})	(Q _{m(std)})	(V _{cr(std)})	(Q _{cr(std)})	Value (Y)	Variation (ΔY)	Std & Corr (Q _{m(std)(corr)})	0.75 SCFM	Variation (ΔH@)	(ΔΔH@)
cubic feet	cfm	cubic feet	cfm			cfm	in H ₂ O		
2.819	0.282	2.783	0.278	0.987	0.001	0.278	1.988	0.118	
4.030	0.403	3.990	0.399	0.990	0.004	0.399	1.870	0.000	
5.429	0.543	5.356	0.536	0.986	0.000	0.536	1.794	-0.076	
7.181	0.718	6.997	0.700	0.974	-0.012	0.700	1.792	-0.078	
9.680	0.968	9.627	0.963	0.995	0.008	0.963	1.907	0.037	
Pre-test Y	0.987	% Deviation	PASS	0.987	Y Average		1.870	ΔH@ Average	

AVERAGE Y= 0.987

AVERAGE ΔH= 1.870

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +/-0.02.
Note: For Calibration Factor H, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +/-0.20.

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR Title 40, Part 60, Appendix A-3, Method 5, 16.2.3

Signature L. Connor Everly

Date 3/17/2021

Y:\SOURCE\Calibration\BLANK CALIBRATION FORMS\High Flow Meterbox Calibration_Critical Orifice

DocNumber: 301952



Praxair Distribution, Inc.
 5700 S. Alameda Street
 Los Angeles CA 90058
 Tel: 323-585-2154
 Fax: 714-542-6689
 PGVP ID: F22020

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

PRAXAIR PKG PHOENIX AZ HS
 3918 W LINCOLN ST
 PHOENIX AZ 85009-5414

Certificate Issuance Date: 03/13/2020
 Praxair Order Number: 71272082
 Part Number: NI CD20015E-AS
 Customer PO Number: 79261417

FBI Date: 03/05/2020
 Lot Number: 70086005503
 Cylinder Style & Outlet: AS CGA 580
 Cylinder Pressure and Volume: 2000 psig 140 ft³

Certified Concentration

Expiration Date:	03/13/2028	NIST Traceable
Cylinder Number:	DT0029914	Expanded Uncertainty
19.86 %	Carbon dioxide	± 0.4 %
19.86 %	Oxygen	± 0.2 %
Balance	Nitrogen	

ProSpec EZ Cert

Certification Information:

Certification Date: 03/13/2020

Term: 96 Months

Expiration Date: 03/13/2028

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1.

Do Not Use this Standard if Pressure is less than 100 PSIG.

CO2 responses have been corrected for Oxygen IR Broadening effect. O2 responses have been corrected for CO2 interference.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: Carbon dioxide

Requested Concentration: 20 %
 Certified Concentration: 19.86 %
 Instrument Used: Horiba VIA-510 S/N 20C194WK
 Analytical Method: NDIR
 Last Multipoint Calibration: 02/24/2020

First Analysis Data:				Date	03/13/2020
Z: 0	R: 19.92	C: 19.86	Conc: 19.85		
R: 19.94	Z: 0	C: 19.88	Conc: 19.87		
Z: 0	C: 19.88	R: 19.94	Conc: 19.87		
UOM: %		Mean Test Assay:		19.86 %	

Reference Standard: Type / Cylinder #: GMIS / CC188344

Concentration / Uncertainty: 19.92 % ±0.296%

Expiration Date: 02/20/2028

Traceable to: SRM # / Sample # / Cylinder #: RGM#CC28033 / N/A / RGM#CC28033

SRM Concentration / Uncertainty: 19.87% / ±0.04%

SRM Expiration Date: 07/15/2021

Second Analysis Data:				Date
Z: 0	R: 0	C: 0	Conc: 0	
R: 0	Z: 0	C: 0	Conc: 0	
Z: 0	C: 0	R: 0	Conc: 0	
UOM: %		Mean Test Assay:		%

Reference Standard: Type / Cylinder #: GMIS / CC707388

Concentration / Uncertainty: 20.87 % ±0.108%

Expiration Date: 12/14/2026

Traceable to: SRM # / Sample # / Cylinder #: SRM 2658s / 71-E-18 / FF22331

SRM Concentration / Uncertainty: 20.863% / ±0.021%

SRM Expiration Date: 08/23/2021

Second Analysis Data:				Date
Z: 0	R: 0	C: 0	Conc: 0	
R: 0	Z: 0	C: 0	Conc: 0	
Z: 0	C: 0	R: 0	Conc: 0	
UOM: %		Mean Test Assay:		%

2. Component: Oxygen

Requested Concentration: 20 %
 Certified Concentration: 19.96 %
 Instrument Used: QXYMAT SE
 Analytical Method: Paramagnetic
 Last Multipoint Calibration: 02/24/2020

First Analysis Data:				Date	03/13/2020
Z: 0	R: 20.88	C: 19.97	Conc: 19.97		
R: 20.88	Z: 0	C: 19.97	Conc: 19.97		
Z: 0	C: 19.93	R: 20.86	Conc: 19.93		
UOM: %		Mean Test Assay:		19.96 %	

Analyzed By

Jenna Lockman

Certified By

Jose Vasquez

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